A STUDY ON
ACUTE INTESTINAL OBSTRUCTION

Dissertation submitted to

The Tamil Nadu Dr. M.G.R.

Medical University,

Chennai – 600032

With fulfillment of the regulations

for the award of Degree

M.S. GENERAL SURGERY

BRANCH – I

DEPARTMENT OF SURGERY

K.A.P.V. GOVT. MEDICAL COLLEGE,

TRICHY.

APRIL 2013

CERTIFICATE

This is to certify that this dissertation titled " **A STUDY ON ACUTE INTESTINAL OBSTRUCTION**" is a bonafide work of **DR.VIJAYAKUMAR.S**., Post Graduate in M.S. General Surgery, Department of General Surgery, K.A.P.V. Government Medical College, Trichy and has been prepared by him under our guidance. This has been submitted in partial fulfillment of regulations of The Tamil Nadu Dr. M.G.R. Medical University, Chennai -32 for the award of M.S. Degree in General Surgery (Branch- I)

Prof. Dr. A.Kanaka Sundaram, M.S.,
Professor and Head of Department,
Department of Surgery,
K.A.P.V. Govt. Medical College,
Trichy .

Prof. Dr. M.K.Muralidharan,M.Ch.,
Professor and Unit Chief,
Department of Surgery,
K.A.P.V. Govt. Medical College,
Trichy.

Prof.Dr.A.Karthikeyan,M.D.,(FM)
Dean,
K.A.P.V. Government Medical College,
Trichy.

DECLARATION

I **Dr. S. VIJAYAKUMAR**, solemnly declare that this dissertation titled, **"A STUDY ON ACUTE INTESTINAL OBSTRUCTION"** is a bonafide work done by me at K.A.P.V. Government Medical College, during 2010-2013 under the guidance and supervision of my Unit Chief **Professor. Dr. M.K.MURALIDHARAN, M.ch., (Neuro).**

The dissertation is submitted to the Tamilnadu Dr. M.G.R. Medical University, towards the partial fulfillment of requirement for the award of M.S. Degree (Branch – I) in General Surgery.

Place: Trichy

Date : **Dr. S.VIJAYAKUMAR**

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DRJ.KALIAMURTHY

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This is to certify that the project work titled **"A STUDY ON ACUTE INTESTINAL OBSTRUCTION"**proposed by DR.S.VIJAYAKUMAR of K.A.P.V.Govt.medicalcollege, Trichyas part of fulfillment of M.S course in the subject of GENERAL SUGERYfor the year 2012-13 by The TamilnaduDr.MGR medical university has been cleared by the ethical committee.

DR.J.Florenceshalini,
Lecturer ,
Dept. of Social Work,
Bishop Heber College,
Trichy.

Dr. J. FLORENCE SHALINI
Assistant Professor
PG Department of Social Work
Bishop Heber College
TRICHY- 620 017.

Prof.K.Ruckmani,
Head of the Department,
Pharmaceutical Engineering & Tech,
Anna University,
Trichy.

Dr. K. RUCKMANI
Prof & Head
Department of Pharmaceutical Technology
Anna University
Regional office, BIT Campus
Tiruchirappalli - 620 024.

D R. J .Kaliamurthy,
Institute of Ophthalmology,
Joseph Eye Hospital, Trichy.

Dr.J. Kaliamurthy Msc, PhD
Associate Professor
Dept.of.Microbiology
Institute of Ophthalmology
Joseph Eye Hospital
Trichy - 620 001

DR.S.Dhanapaul,
Prof & H.O.D,
Dept of Microbiology,
K.A,P.V.Medical College,
Trichy.

Dr. S. DHANAPAUL, M.D., M.B.A.
Prof & Head
Dept. of Microbiology
K.A.P.V. Govt. Medical College
Trichy

CHAIRMAN
DR. Philip Thomas
Institute of Ophthalmology
Joseph Eye Hospital, Trichy

Dr.PHILIP A. THOMAS, M.B.B.S., M.D., Ph.D.
M.A.M.S., F.A.B.M.S., F.I.M.S.A.,
PROFESSOR AND HEAD DEPT. OF OCULAR MICROBIOLOGY,
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INTRODUCTION Acute intestinal obstruction is one of the most common cause for admissions for abdominal pain worldwide. It is a common and potentially dangerous complication needing surgery. Patients present with a wide range of complaints. Difficulty often arises in making a correct diagnosis. Detailed history and thorough physical examination is often helpful in diagnosis and planning treatment. ELIGIBILITY CRITERIA All patients admitted and diagnosed as having intestinal obstruction and undergone emergency surgery were analysed and considered for study. This was a prospective study undertaken in K.A.P.V. Government Medical College Hospital, Trichy from September 2010 to November 2012....


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INTRODUCTION
Acute intestinal obstruction is one of the most common cause for admissions for abdominal pain worldwide. It is a common and potentially dangerous complication needing surgery. Patients present with a wide range of complaints. Difficulty often arises in making a correct diagnosis. Detailed history and thorough physical examination is often helpful in diagnosis and planning treatment.
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CONTENTS

INTRODUCTION

Acute intestinal obstruction is one of the most common cause for admissions in surgical side worldwide. It is a common and potentially dangerous complication needing surgery. Patients present with a wide range of complaints and difficulty often arises in making a correct diagnosis. Detailed history and thorough physical examination is often helpful in diagnosis and planning treatment.

ELIGIBILITY CRITERIA

All patients admitted and diagnosed as having dynamic intestinal obstruction and undergone emergency surgery were analysed and considered for study. This was a prospective study undertaken in K.A.P.V. Government Medical College Hospital, Trichy from September 2010 to November 2012.

EXCLUSION CRITERIA

- All paediatric patients
- Patients who were conservatively managed
- All cases of inguinal hernia with intestinal obstruction which reduced spontaneously

AIM OF THE STUDY

1. To identify the causes of acute intestinal obstruction in K.A.P.V. Government Medical College, Trichy.
2. To analyse various clinical presentations of acute intestinal obstruction in our hospital.
3. To analyse management and outcome of patients with acute intestinal obstruction in our hospital.

REVIEW OF LITERATURE

HISTORICAL ASPECTS

Sushrutha(6th century BC)

Wrote oldest known descriptions of bowel surgery. Described using a cautery over the swelling of strangulated hernias. Used the mandibles of black ants to clamp the edges of bowel wounds together.

Hippocrates(460-370 BC)

Argued against surgical treatment of the abdomen. Provided a detailed description of intestinal obstruction: "In ileus, the belly becomes hard, there are no motions; the whole abdomen is painful, there are fever and thirst and sometimes the patient is so tormented that he vomits bile."

Praxagoras (350 BC)

Advocated opening the abdomen as a last resort to relieve "iliac passion" making an incision over the swelling of a strangulated hernia, freeing the intestine and establishing an artificial anus.

Sanctus (16th century)

Treated intestinal obstructions by giving patients metallic mercury (up to three pounds) and using the weight of the mercury to try to open the intestines.

Franco (1556)

Described his experience in surgically treating strangulated inguinal hernia. He made an incision over the swelling, divided the constricting band, inserted a goose-quill-sized cannula, and returned the bowel to the peritoneum.

Sydenham (1624-1689)

Managed intestinal obstruction using opium. He also recommended rest and horseback rides as therapy.

Mery(1701)

Removed several feet of gangrenous bowel and established an artificial anus in a woman suffering from a strangulated hernia

Cooper(1804)

Inverted patients, suspending them over the shoulders of a strong attendant, to treat strangulated hernias. Also used isinglass (ichthyocolla) and suture in experiments connecting divided canine intestines.

Paul and Mickulickz(1908)

Described exteriorisation of bowel

Schwartz(1911)

Used x-ray films to determine areas of intestinal distention

Henri Hartmann(1921)

Described Hartman’s procedure . In rectosigmoid growth distal stump closure and sigmoid colon excision with proximal diversion done.

Wangensteen(1932)

Advanced methods of intestinal decompression to treat intestinal obstruction (reducing mortality from 60-80% to 20%) while advocating excessive saline infusion for patients with a high obstruction. He changed the initial stage of a three-stage decompression from a proximal cutaneous jejunostomy to a more distal cutaneous jejunostomy; the other two stages (enterolysis and stoma closure) went unchanged. (1)

SURGICAL ANATOMY

Intestine forms the longest part of the digestive tract. It is formed by the long, less distensible small intestine and shorter more distensible large intestine. The small gut is suspended by its mesentery which extends from the left side of the 2nd Lumbar vertebra to the right iliac fossa, crossing the third part of the duodenum, aorta, vena cava, and right ureter in its course.

Mesentery is 1.5 metres in length along its line of attachment, but along its free border it is as long as the small gut. The length of the mesentery is very long but the attachment is very narrow which makes it more prone for obstruction following adhesions or axial rotation of the bowel.

Small intestine:

Small intestine extends from pylorus to ileo caecal junction. It consists of duodenum, jejunum and ileum. It measures about 6 metres length. Upper part is fixed which is duodenum and the lower mobile part consists of jejunum and ileum. The upper two fifths of the mobile parts is known as jejunum and the lower three fifths known as ileum.

Duodenum:

Fixed part of the small intestine measuring 25cm in length. Mostly retroperitoneal except at its end. Divided into four parts

First or superior part measuring 5 cm long

Second or descending part measuring 7.5cm long

Third or horizontal part measuring 10cm long

Fourth or ascending part measuring 2.5cm long

Jejunum and ileum:

Jejunum starts from the duodenojejunal flexure. It is wider, thicker and more vascular. It is wider, diameter measuring 4cm.

Ileum is narrower measuring 3.75 cm. It is thinner and less vascular. Jejunum and ileum attached to the posterior abdominal wall by mesentery which allows free motion. Ileum ends at ileo caecal junction.

Large intestine:

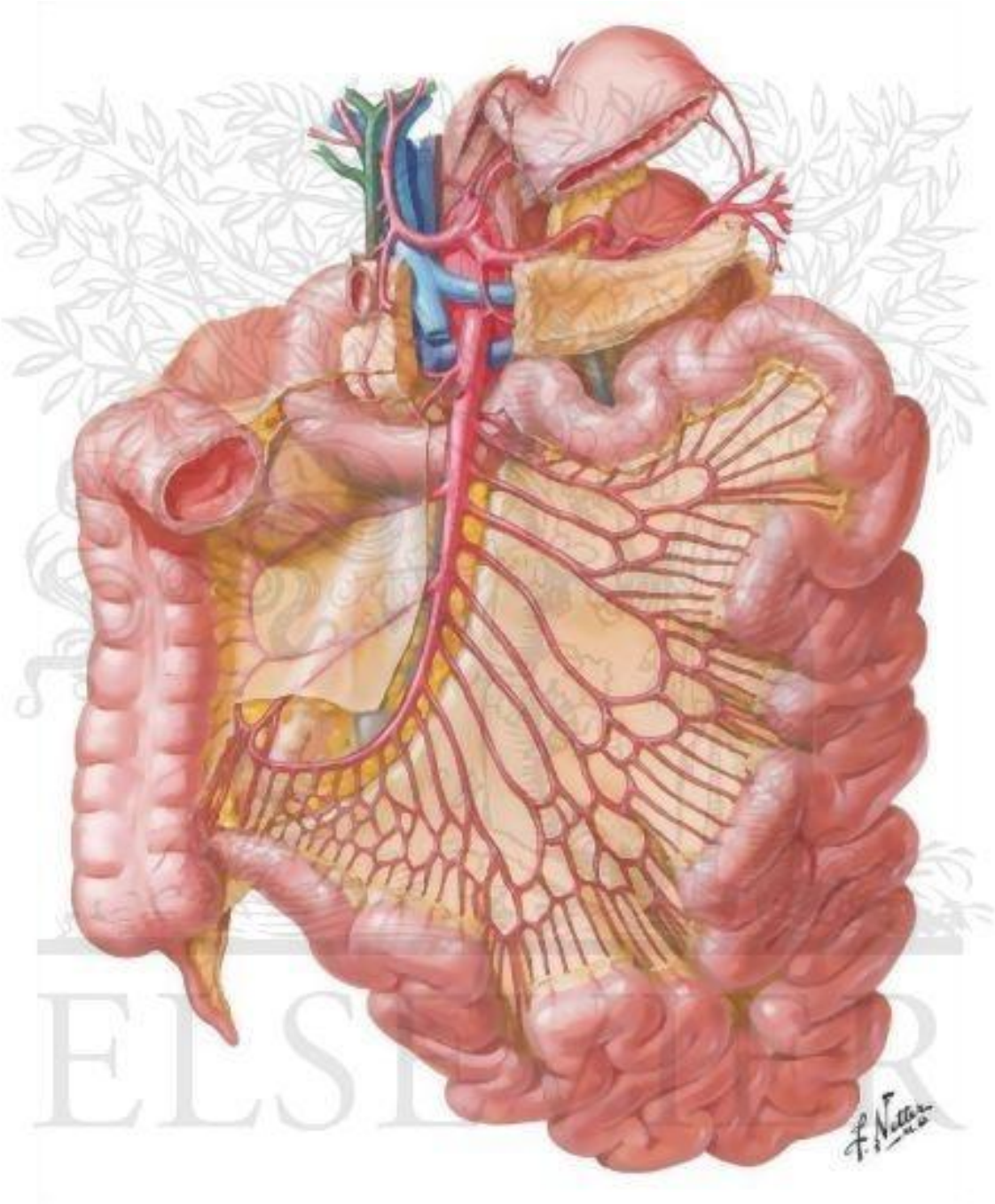
It starts from the ileo caecal junction and ends in the anus measuring about 1.5 metres. It forms $1/5^{th}$ of the intestinal tract. Wider in calibre than the small intestine. Lumen is wider at its commencement and it gradually diminishes towards the rectum. It is divided into Caecum, ascending colon, hepatic flexure, descending colon, splenic flexure, transverse colon, sigmoid colon, rectum and anal canal.

Caecum	- 6.25cm long and 7.5cm broad
Ascending colon	- 12.5 cm long
Transverse colon	- 50 cm long
Descending colon	- 25 cm long
Sigmoid colon	- 37.5 cm long
Rectum	- 12 cm
Anal canal	- 4 cm

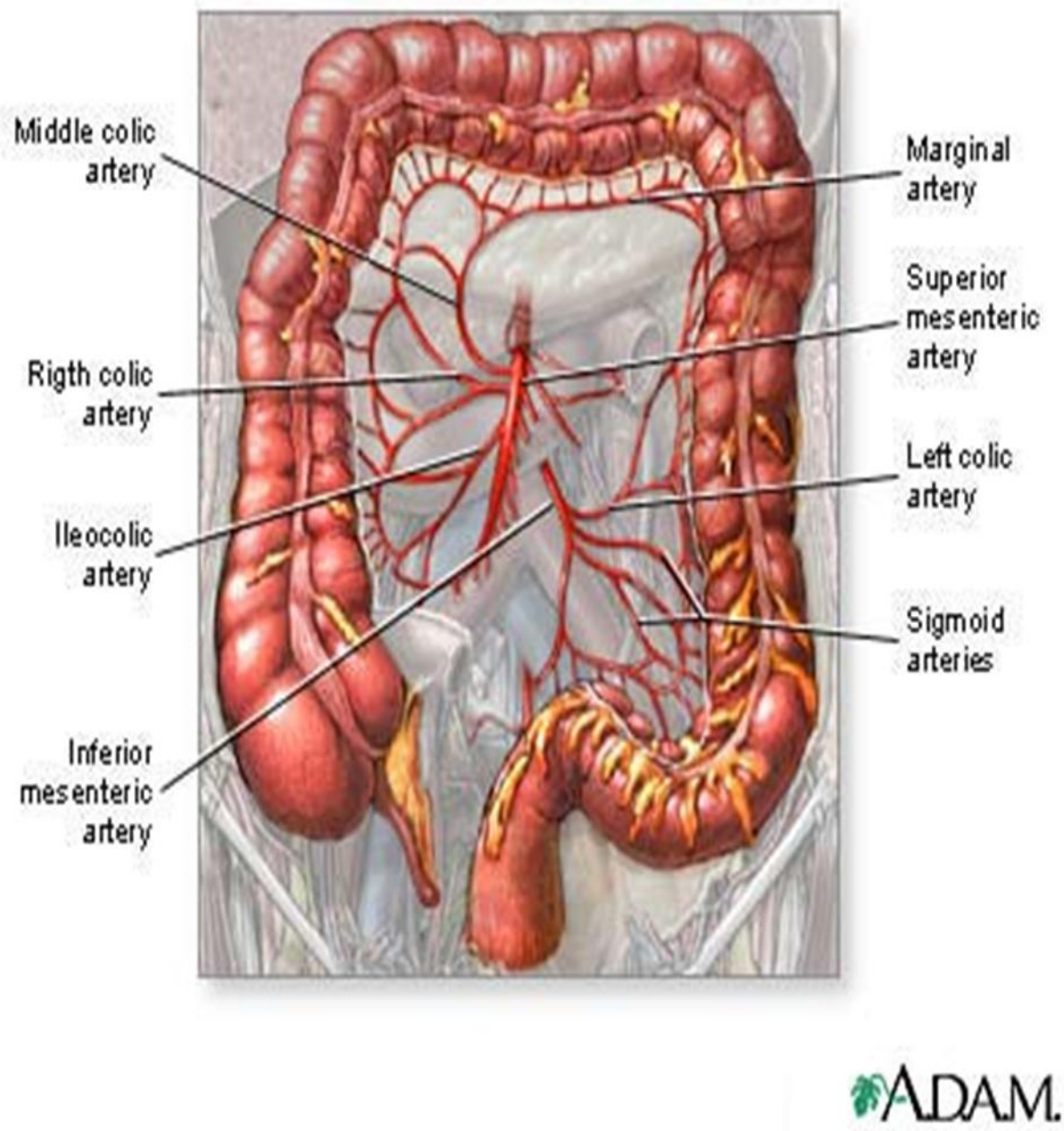
Appendix arises from the posteromedial wall of the caecum about 2 cm from the ileocaecal valve. (1)

BLOOD SUPPLY OF SMALL

BOWEL

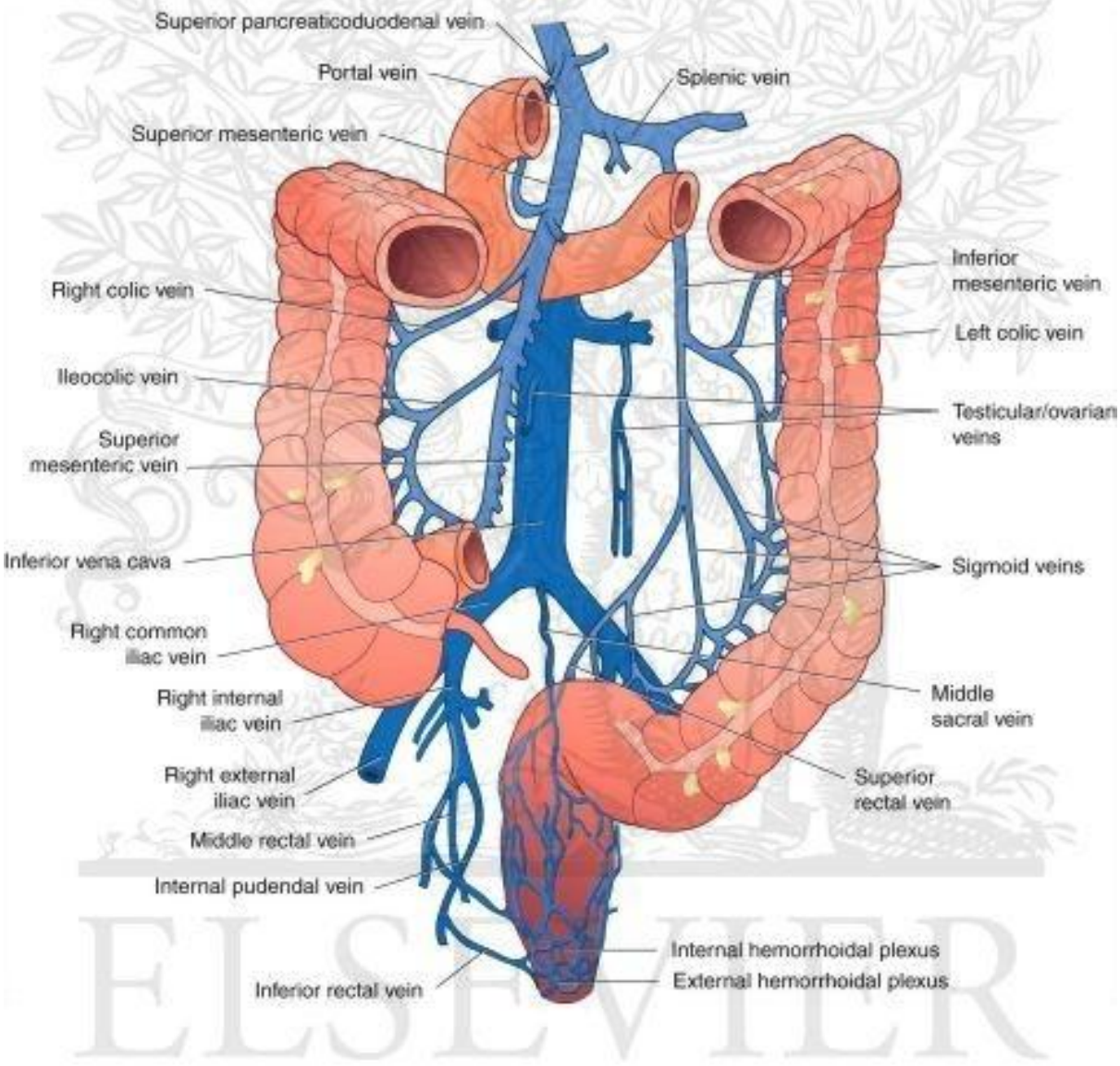


BLOOD SUPPLY OF THE LARGE BOWEL

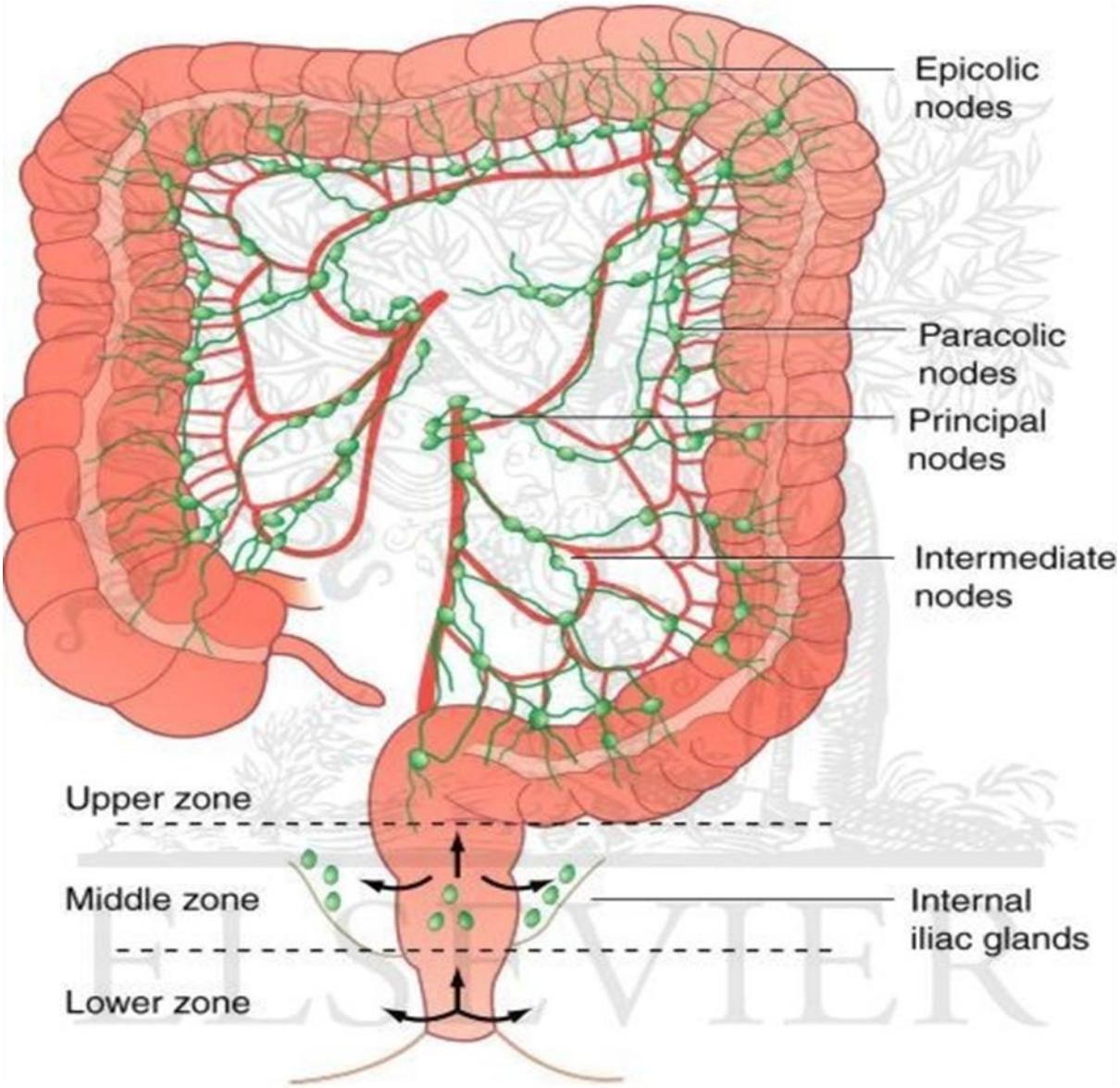


VENOUS DRAINAGE OF THE LARGE

BOWEL



LYMPHATIC DRAINAGE OF THE LARGE INTESTINE



BLOOD SUPPLY:

Duodenum:

Duodenum above the level of opening of bile duct is supplied by superior pancreatico duodenal artery and below the opening is supplied by inferior pancreatico duodenal artery. First part also receives blood supply from right gastric artery, supraduodenal artery of wilkie, retroduodenal branches from gastroduodenal artery and branches from right gastro epiploic artery.

Jejunum and ileum is supplied by branches from superior mesenteric artery. Caecum is supplied by caecal branches of ileo colic artery. Appendix is supplied by appendicular artery which is the lower branch of the ileo colic artery. Ascending colon, right two thirds of transverse colon is supplied by superior mesenteric artery.

Left one third of transverse colon, descending colon, sigmoid colon, rectum and anal canal above the level of anal valves is supplied by inferior mesenteric artery.

VENOUS DRAINAGE:

Veins of the duodenum drains into the splenic, superior mesenteric and portal veins. Jejunum and ileum drains into superior mesenteric veins. Superior mesenteric vein also drains appendix, caecum, ascending colon and transverse colon.

Inferior mesenteric veins drains upper one third of rectum, anal canal, sigmoid colon and transverse colon.

Internal iliac vein drains lower one third of rectum.

Anal canal drained by superior and inferior rectal vein.

LYMPHATIC DRAINAGE:

SMALL INTESTINE:

Duodenum :

Lymph vessels drains into pancreatico duodenal nodes. From there to the hepatic nodes and then to the coeliac nodes, superior mesenteric nodes and finally into the cisterna chyli.

Jejunum and Ileum:

Drains into plexus of wall of gut and then to the nodes in the mesentery along superior mesenteric nodes and finally into nodes in front of aorta at origin of superior mesenteric artery.

LARGE INTESTINE:

Passes through four sets of lymph nodes.

- Epicolic lymph nodes - on the wall of the gut
- Paracolic nodes - medial sides of ascending and descending colon, mesocolic border of transverse and sigmoid colon
- Intermediate nodes – on main branches of vessels
- Terminal nodes (Principal) – on superior and inferior mesenteric vessels.

ACUTE INTESTINAL OBSTRUCTION

DEFINITION:

It is defined as the partial or complete or partial obstruction of the passage of the contents of the bowel either as a result of mechanical obstruction or ileus.

CLASSIFICATION:

Based on aetiology

- Mechanical obstruction (Dynamic)
- Functional obstruction. (Adynamic)

Based on duration

- Acute obstruction
- Chronic obstruction

Based on extent of occlusion of lumen

- Partial obstruction
- Complete obstruction

Type of obstruction

- Simple
- Closed loop

Site of obstruction

- Proximal small bowel
- Distal small bowel
- Large bowel

Mechanical bowel obstruction :

Also known as dynamic obstruction. It is usually caused by a physical blockage of the intestinal contents. Blockage is either due to intrisinc or extrinsic to the bowel wall. Partial obstruction arises when the intestinal lumen is narrowed but it will allow passage of gas, chyme and some intestinal contents. In case of complete obstruction there is complete obstruction so that no content passes distal to the site of obstruction. Complete obstruction is further classified into simple obstruction and closed loop obstruction or strangulated obstruction. In simple obstruction there is no vascular compromise and we can decompress the intestine proximally. Closed loop obstruction occurs when both ends of the bowel involved is obstructed including the mesentery as a consequence of constrictive lesion (volvulus). As the secretion increases intraluminal pressure increases. Blood supply to the closed loop gets compromised leading to strangulation, gangrene and perforation.

Functional bowel obstruction (Adynamic):

Also known as adynamic obstruction or pseudo obstruction. It occurs as a result of obstruction secondary to factors that cause paralysis or dysmotility of intestine. Post operative ileus is the most common cause which is usually considered as a physiologic response. Ileus prolonged in

radiation enteropathy, chronic obstruction and severe peritonitis. In radiation enteritis it is mainly due to damage to neuromuscular bundles.

AETIOLOGY:

Laparatomy

Electrolyte imbalance

e.g. Hypokalemia, Hypernatremia, Hypomagnesemia

Drugs

Narcotics, phenothiazines, Diltiazem, Anti cholinergic drugs

Intra abdominal inflammation

Appendicitis, perforated duodenal ulcer, diverticulitis

Retro peritoneal inflammation or haemorrhage

Lumbar compression fracture, Acute Pancreatitis, Pyelonephritis

Intestinal ischaemia

Mesenteric artery thrombosis, Mesenteric venous thrombosis, chronic mesenteric ischaemia.

Thoracic diseases

Lower rib fracture, Lower lobe pneumonia, Myocardial infarction.

Systemic sepsis

Post operative ileus.

Ogilvie’s syndrome.

AETIOLOGY

MECHANICAL BOWEL OBSTRUCTION:

Intrinsic causes:

1. Congenital
    - Intestinal atresia
    - Meckel's diverticulum
    - Duplication/cysts
2. Infections
    - Tuberculosis
    - Actinomycosis
    - Diverticulosis
3. Inflammatory
    - Crohn's disease
    - Eosinophilic granuloma
4. Neoplastic
    - Primary neoplasms
    - Metastatic neoplasms
5. Miscellaneous
    - Intramural haematoma
    - Intussusception
    - Radiation enteropathy
    - Ischaemic stricture

Intraluminal causes:

1. Gall stone
2. Enterolith
3. Phytobezoar
4. Swallowed foreign body
5. Parasite infestation

Extrinsic causes

1. Congenital
    - Annular pancreas
    - Mal rotation
    - Omphalo mesenteric remnants
2. Adhesions
    - Post operative
    - Post inflammatory
    - Congenital
3. Hernias
    - External abdominal wall
    - Internal
    - Incisional
4. Inflammatory
    - Intra abdominal abscesses
    - Starch peritonitis

5. Miscellaneous

    Volvulus

    Superior mesenteric artery syndrome

    Gossypiboma

Most common cause of intestinal obstruction are hernias,adhesions, malignancy of large bowel.

1.HERNIAS:

Inguinal hernias is one of the most common cause of intestinal obstruction followed by femoral, ventral, incisional, umbilical and internal hernias.

The obliquity of the inguinal canal and the increased frequency of inguinal hernias makes inguinal hernia the most frequent problem associated with small bowel obstruction. The rigid hernial defect through which the intestine protrudes makes it more vulnerable for strangulation.

The occurrence of obstruction without previous history of surgery suggests hernia as a cause of small bowel obstruction. If no hernia is discovered in physical examination then we must think of internal hernias such as para duodenal hernias and obturator hernias.

Retro anastamotic and para stomal hernias are also important causes of intestinal obstruction in patients who had procedures done on them and who had mesenteric defects present in them.

The various studies to find out the frequency of the type of hernias are given below.

Types	**STEWARDSON N = 57**
Inguinal	**54%**
Femoral	**14%**
Incisional	**14%**
Umbilical	**16%**
Internal	**--**

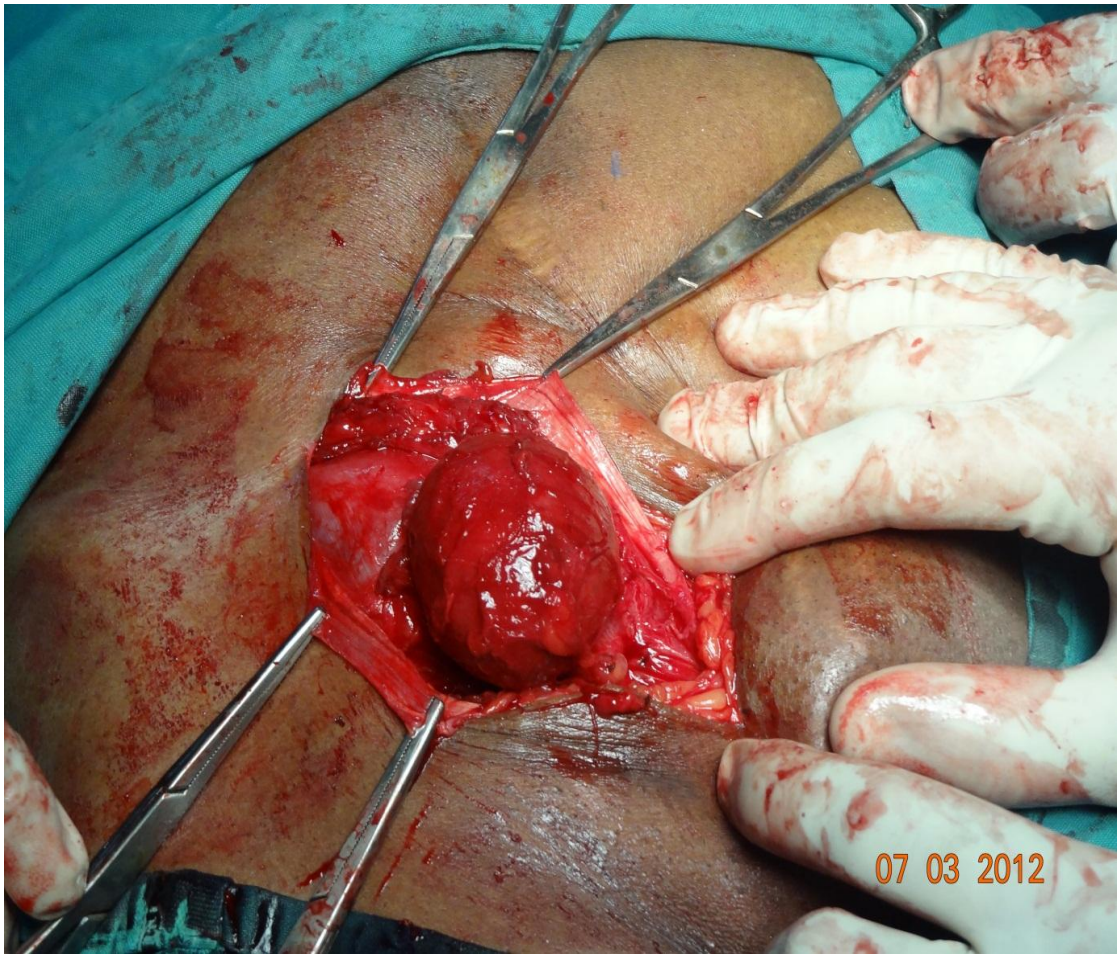
(16)

Types	**MUCHA N=47**
Inguinal	**26%**
Femoral	**9%**
Incisional	**21%**
Umbilical	**8%**
Internal	**34%**

(15)

Types	MCENTEE N = 59
Inguinal	46%
Femoral	37%
Incisional	10%
Umbilical	3%
Internal	--

Types	GREENE N = 106
Inguinal	54%
Femoral	24%
Incisional	7%
Umbilical	9%
Internal	4%

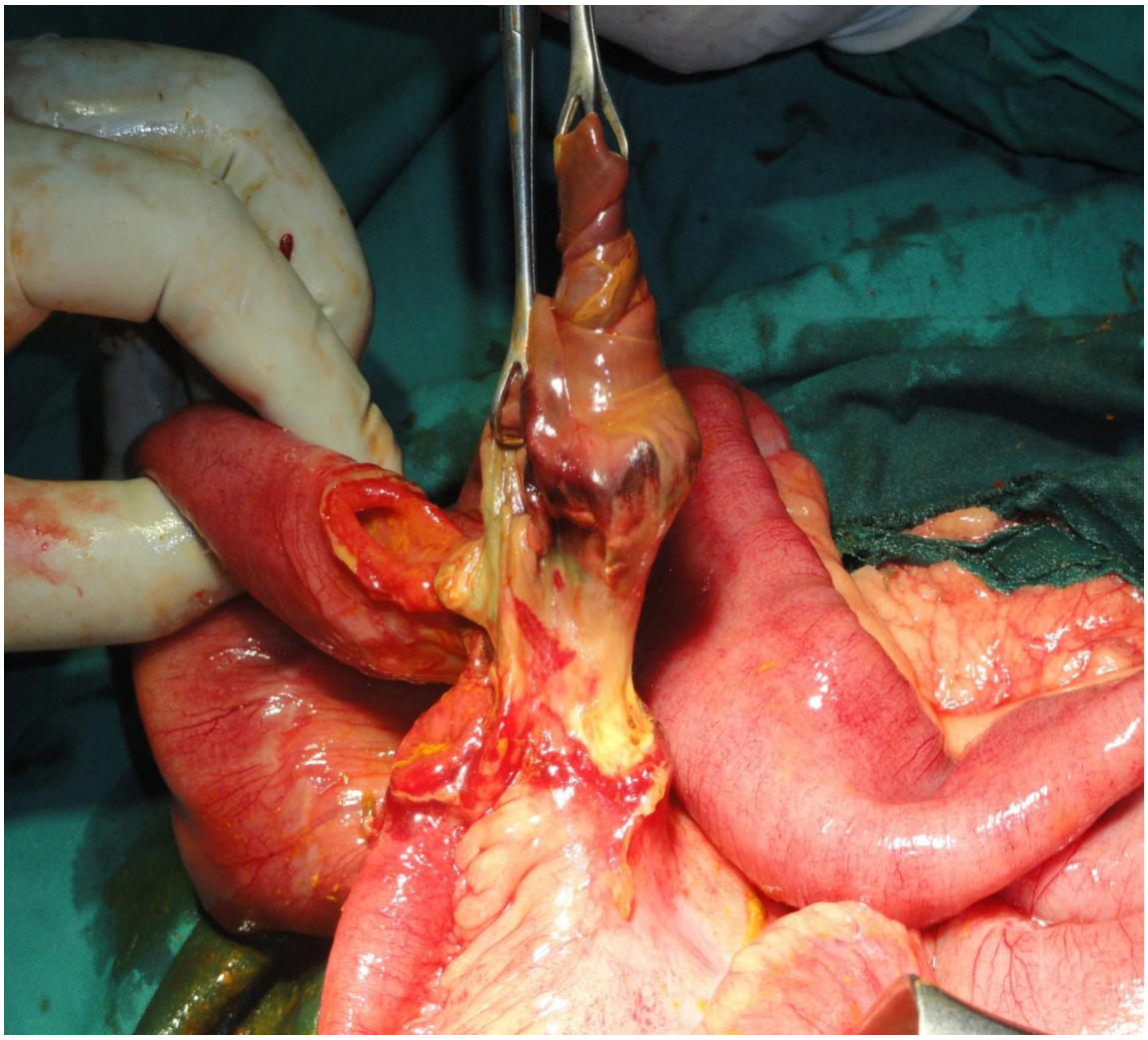


OPERATIVE PHOTOGRAPH SHOWING OBSTRUCTED

INGUINAL HERNIA

PATIENT NAME : RAJESWARI, 43 YEARS FEMALE

DATE OF SURGERY : 07/03/2012



OPERATIVE PHOTOGRAPH SHOWING STRANGULATED INGUINAL HERNIA WITH GANGRENE OF ILEUM.

PATIENT NAME : GANDHI, 40 YEARS/MALE

DATE OF SURGERY : 22/12/2010.

ADHESIONS:

Adhesions are defined as the abnormal attachments between the tissue surfaces which may be congenital or acquired. In developed countries it is the common cause of intestinal obstruction but in developing it is the second common cause of acute intestinal obstruction next to hernias.

Pelvic surgeries are most commonly associated with post operative adhesions. Types of adhesions are fibrous and fibrinous adhesions.

Causes of Adhesions:

- Ischaemia of bowel
- Sepsis
- Gynaecological surgeries
- Bowel injury
- Radiation induced enteritis
- Presence of foreign bodies
- Inflammatory bowel diseases

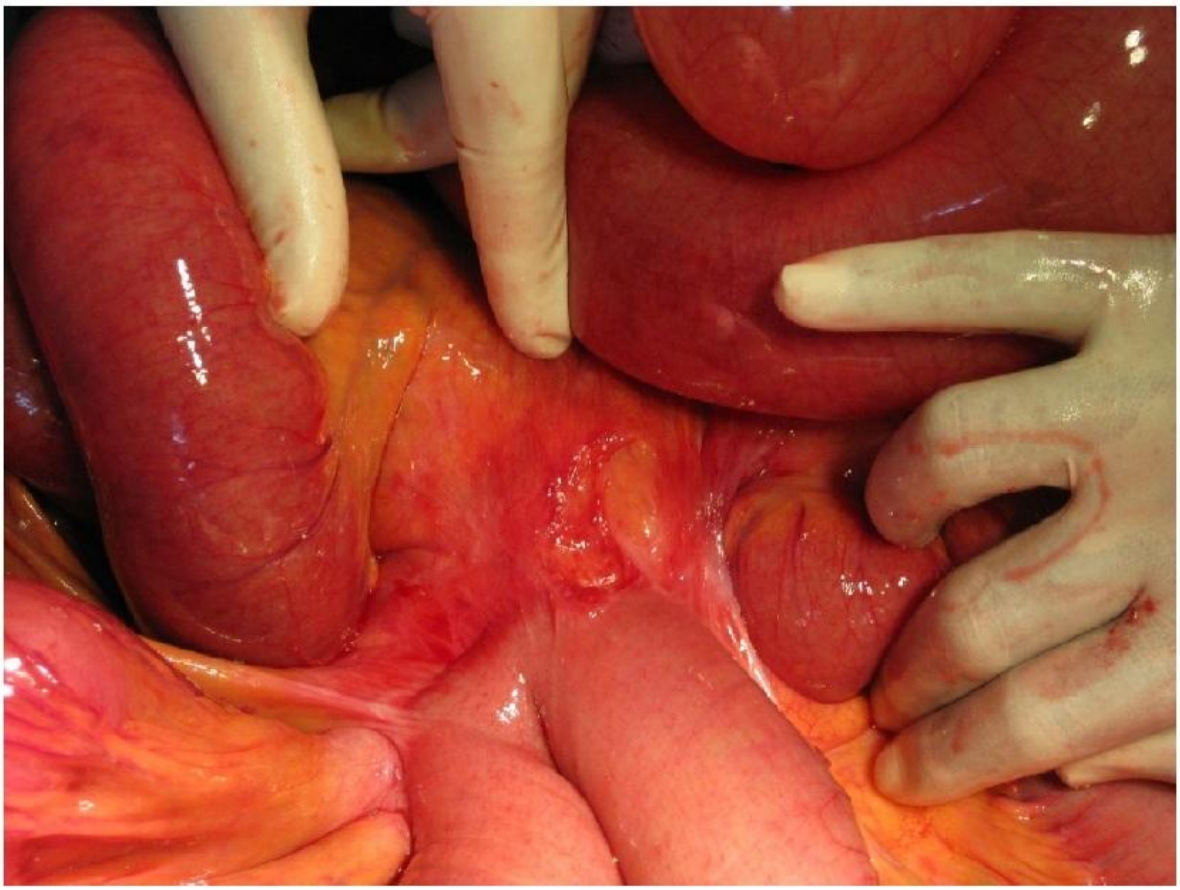
Surgeries for structures in the inframesocolic compartment are associated with increases risk of adhesions. Pelvic surgeries like gynaecological procedures, surgeries on rectum, anal canal and colon are associated with increased risk of adhesions.

Prevention of adhesions:

Pioneering works have been done by Boys (1942) connoly and Smith (1960) and Ellis (1971). Broadly the methods are

1. Attempts to prevent fibrin deposition by the use of anticoagulants like sodium citrate, heparrin dicoumarol, and dextran.
2. Attempt to remove the fibrin exudate, by intraperitoneal lavage by using enzymes such as pepsin, trypsin and fibrinolytic agents like streptokinase and urokinase.
3. Attempt to separate bowel surfaces like distension of abdominal cavity with oxygen, stimulation of peristalsis with prostigmine and the use of olive oil, liquid paraffin and amniotic fluid.
4. Attempt to inhibit fibroblast proliferation by use of antihistamines, steroids and even cytotoxic drugs.
5. Avoidance of suture reperitonealisation with exception of mesenteric defects and serosal reapproximation at anastomosis.
6. Manual replacement of the abdominal contents to as near a normal position prior to closure of abdomen.
7. Preservation of greater omentum.
8. Protection of anastomosis and promotion of healing with omentum.

ADHESIONS



INTRA OPERATIVE PHOTOGRAPH SHOWING ADHESIONS

NAME OF THE PATIENT : RAJU, 49 YEARS, MALE

DATE OF SURGERY : 25/01/2012

9. Draping greater omentum over the small intestine as a barrier between the intestine and anterior peritoneum.
10. Closure of the abdominal wall fascia without reapproximation of the anterior peritoneum.

Other practically possible simple techniques in prophylaxis against adhesions include,

1. Delicate handling of tissues and organs
2. Avoidance of spillage of visceral contents during surgery.
3. Minimizing operative blood loss.
4. Protection of exposed viscera from drying
5. Avoidance of closure of parietal peritoneal defects.
6. Washing the operative region and peritoneal cavity with isotonic saline at the end of the operation.

Meticulous surgical techniques should be aimed at and must include the prevention of granuloma formation from foreign materials. Peritoneal defects must be left open, rather than being pulled together under tension. Another technique of preventing adhesion in the small bowel is to draw the omentum over other abdominal viscera before closing the incision, and especially over an anastamotic site. If the omentum is not available, falciform ligament or the broad ligament in the female can be used.

TREATMENT

A number of plication procedures have been devised. The operation was introduced by Winchman, a surgeon in 1934, but was popularised by Noble in 1937. Transmesenteric plication of loops of small intestine was introduced by Childs and Phillips in 1960. It was safer than Noble's procedure, but studies by Hollander (1971) have shown that further episodes of obstruction can occur.

Baker in 1959 described the technique of threading a tube down the whole length of the small intestine via a jejunostomy so that the stiffness produced will prevent kinking while adhesions develop. Bands can be congenital or following previous bacterial peritonitis. If the intestine is viable division of the band alone is needed. If the intestine is gangrenous resection and anastomosis must be done.

NEOPLASMS

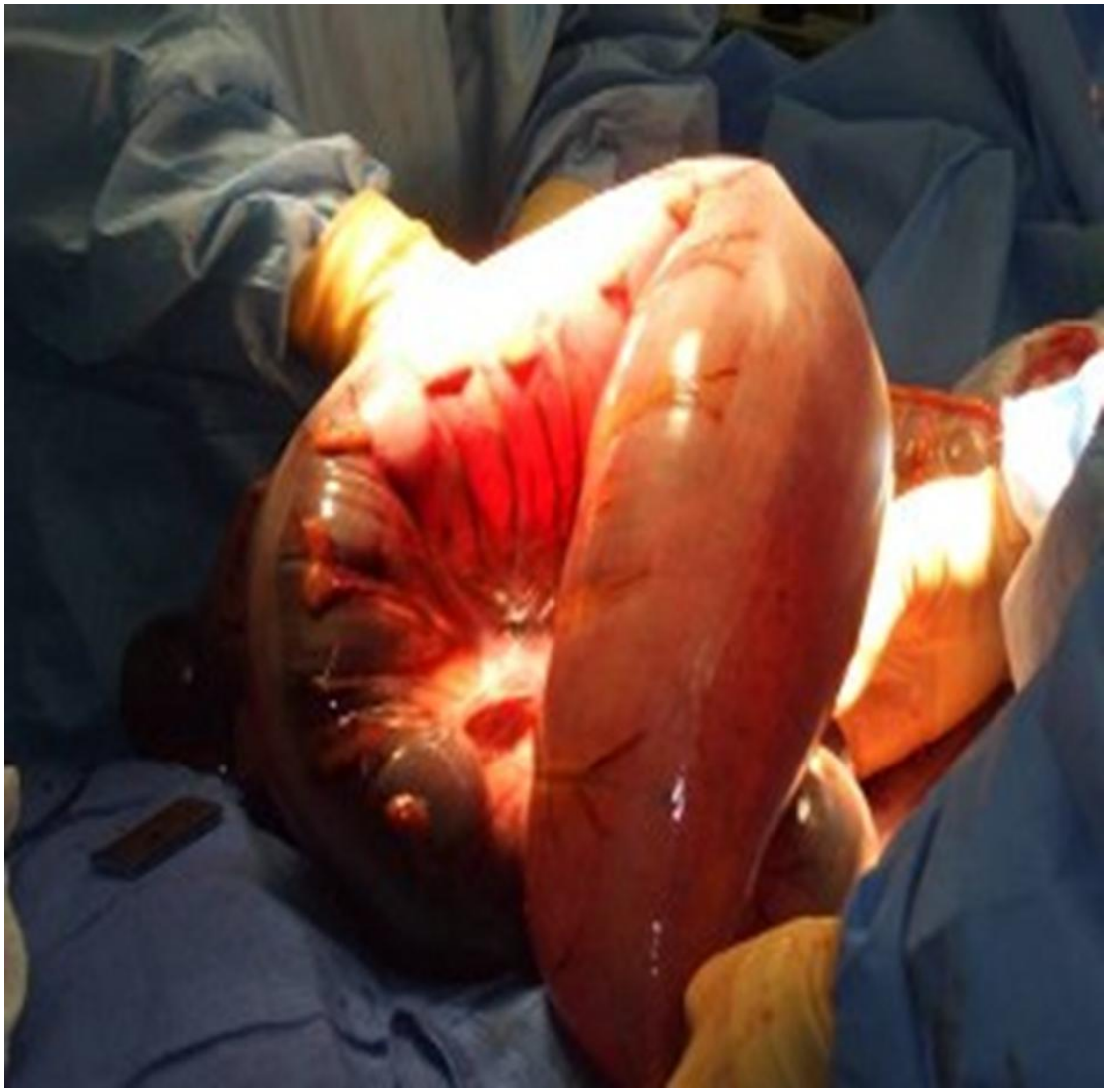
Unlike small bowel the most common cause of intestinal obstruction in large bowel is neoplasms. Malignant melanoma, malignancy of breast, colon , kindey, lung causes peritoneal deposits which causes small bowel obstruction. Extrinsic compression by gastro intestinal tumours like pancreas, colon and gastric cancers produce small bowel obstruction. Gynaeocological tumours also produces extrinsic compression of small bowel.

INTUSSUSCEPTION:

Intussusception accounts for 2% of cases of acute intestinal obstruction in adults. Mostly occurs in the sixth and seventh decade. The most common being neoplasms which accounts for 50% of cases followed by inflammatory lesions. Congenital lesions (Meckel's diverticulum) or other localised abnormalities form the most important cause. Primary intussusception accounts only a small percentage of cases.

SIGMOID VOLVULUS:

It is common in India and especially in south India because of the consumption of high fibre diet. It is the twist in axial rotation of bowel and mesentery either in the clockwise or anticlockwise direction. Sigmoid volvulus accounts for 75% of all volvulus. The predisposing factor includes adhesions, peridiverticulitis, overloaded reduntant pelvic colon, long pelvic mesocolon and narrow attachment of sigmoid mesocolon. Abdominal distension is early and vomiting is late. The classical feature in abdominal x-ray is dilated loop of bowel running diagonally running across the abdomen from right to left.



OPERATIVE PHOTOGRAPH OF SIGMOID VOLVULUS

NAME OF THE PATIENT : VAIRAPERUMAL, 28 YEARS, MALE

DATE OF SURGERY : 2/8/2011.

CROHN'S DISEASE:

It accounts for 5% of patients with small bowel obstruction. During the period of acute exacerbation there will be reversible inflammatory process involving the bowel wall which causes stricture. Stricture also may be a result of chronic process which causes intestinal obstruction.

RADIATION ENTERITIS:

Radiation injury causes obliterative vasculitis and fibrosis. It may lead to a chronic recurrent low grade obstruction of small bowel or cicatrisation and bleeding per rectum.

ACUTE COLONIC PSEUDO OBSTRUCTION:

Also known as "OGILVIE'S SYNDROME". Pathogenesis of this syndrome is unknown. If left untreated it may lead to ischaemic necrosis and colonic perforation. Current evidence shows that it is mainly due to autonomic imbalance caused by parasympathetic suppression. Motility enhancing drugs like Erythromycin, Neostigmine play a role in overcoming this pseudo obstruction.

EPIDEMIOLOGY

Aetiology and frequency of bowel obstruction varies throughout the world. It depends on the ethnicity, age group, dietary habits and geographical location. In developed countries the most common cause of intestinal obstruction is adhesions but in developing countries the most common cause is obstructed hernias. In early 1900s in developed countries the common aetiology is incarcerated hernias but towards the 20th century the frequency of intestinal obstruction has moved towards adhesions. With the advent of minimal access laparoscopic surgery the frequency of bowel obstruction secondary to adhesions has shown a declining trend.

Intestinal obstruction due to adhesions is common in women because of the increased frequency of obstetric, gynaecologic and pelvic surgeries. Small bowel is the most common site of intestinal obstruction which account for 80% followed by large bowel which account for 20%. In large bowel the most common cause of intestinal obstruction is colorectal malignancies which account for 60-70% of cases followed by diverticulitis and volvulus which accounts for the remaining 30% of the cases. (8)

Mortality in simple obstruction is about 3% , whereas in cases of obstruction with vascular compromise, perforation and comorbidities the

mortality rate increases up to 30%. 12% of patients with intestinal obstruction who were treated conservatively had a chance of recurrence. In cases of adhesions who were operated the recurrence rate varies from 8% - 32%.

PATHOPHYSIOLOGY

Intestinal obstruction results in alteration of the bowel physiology. Most of the abnormalities occurring is mainly due to increase in blood flow during the initial phase of intestinal obstruction and inflammatory reaction. Production of reactive oxygen species plays a key role and it is one of the most important mediator of changes in dynamic bowel obstruction. Inflammatory reaction plays a key role in pathophysiology of bowel obstruction.

During the initial phases of intestinal obstruction there is increased peristalsis to overcome the obstruction. Then it becomes vigorous. As the obstruction is not relieved the increasing distension causes the peristalsis to caese resulting in flaccid, paralysed and dilated bowel.

Distension, Absorption and Secretion:

Bowel distension is the constant and characteristic feature of intestinal obstruction. Fluid and gas collects proximal to the obstruction. Fluid is derived from saliva, secretion of stomach, pancreas and intestine. Air accumulates proximal to obstruction. 70% derived from swallowed air, 20% from diffusion from blood into lumen, 10% from the action of bacteria on food particles. Of the gas accumulating 75% consists of nitrogen . The dilated bowel causes inflammatory changes in the bowel and it activates neutrophils and macrophages. It accumulates in the bowel

and damages secretory and motor process. It occurs by the release of proteolytic enzymes, cytokines and other mediators of inflammation. It increases release of nitric oxide which inhibits smooth muscle tone which increases the intestinal dilatation and inhibiting the contracting power of the bowel. Nitric oxide release is directly proportional to the severity of the bowel obstruction.

During initial 12 hours water and electrolytes accumulate in the bowel lumen which is secondary to decrease in net absorption. In the next 12 hours there is accumulation of water and electrolytes which is due to decrease in absorption and increase in secretion from the intestine. Bacterial toxins, vasoactive peptides and oxygen derived free radicals increases the fluid secretion into lumen.

Intestinal motility:

During initial phase the peristalsis increases to propel the contents past the obstruction. Later contractile capacity decreases due to bowel wall hypoxia and intramural inflammation.

Circulatory changes:

Extrinsic compression of the bowel and mesentery or closed loop obstruction causes vascular compromise and gangrene. Dilatation of bowel wall increases the intraluminal pressure which exceeds the bowel wall venous pressure. It also increases the transmural pressure on capillary blood flow of bowel wall. This leads to eventual blockade of

arterial perfusion causing bowel necrosis and gangrene. For any given pressure in the lumen of the bowel the tension in the bowel wall is proportional to the diameter of the bowel, so that the greatest distension is seen in the caecum, which is the commonest site of perforation in intestinal obstruction. (The relationship between the tension and pressure is governed by the lawof Laplace which states that T α pr where T=tension; P=pressure and r=radius).

Bacterial colonisation:

The upper small bowel contains facultative gram positive organisms. In jejunum it is less than 10^6 colonies/ml and in ileum it is 10^8 colonies/ml. Due to obstruction the bacteria multiplies resulting in release of toxins which causes further mucosal damage and disrupted mucosal defence. It is followed by translocation of bacteria into submucosa and toxins into circulation which results in bacteremia, septicaemia, Systemic inflammatory response syndrome(SIRS), MODS and death.

Clinical features:

The clinical feature of intestinal obstruction includes crampy abdominal pain, distension, acute obstipation, nausea and vomiting.

Abdominal pain:

Abdomen pain precede nausea and vomiting. Initially colicky in nature which suggests obstruction later diffuse in nature which suggests

strangulation. In small bowel obstruction the pain is crampy. In large bowel obstruction the pain is of longer duration.

Vomiting:

In jejunal obstruction vomiting is early and persistent but in case of ileal obstruction it is recurrent and occurs at regular intervals. In large bowel obstruction vomiting is a late feature.

Abdominal distension:

Distension is absent or minimal in jejunal obstruction and enormous in case of large bowel obstruction.

Obstipation:

Absolute constipation – neither faeces nor flatus is passed.

Dehydration:

Tachycardia, hypotension and oliguria are advanced signs of dehydration. Should be corrected aggressively.

Abdominal tenderness:

Initially localised later diffuse. Rebound tenderness and guarding are features of strangulation and peritonitis.

Temperature:

Fever suggests inflammation of the bowel wall. It also signifies ischaemia and perforation. When septicaemia develops then hypothermia occurs which is due to lack of pyrogenic response. It indicates poor prognosis.

Bowel sounds:

In mechanical bowel obstruction there is increased frequency of bowel sounds. Initially the bowel sounds are high pitched metallic sounds – rushes and groans. It is followed by metallic tinkling sounds of dilated bowel – water dripping into a large hollow container. Once fatigue occurs or gangrene occurs then silent abdomen of peritonitis develops.

Per rectal examination:

Shows empty dilated rectum with tenderness. We have to look for faecal impaction and colour of stools.

PATHOPHYSIOLOGY OF STRANGULATED BOWEL OBSTRUCTION

Onset of intestinal obstruction

↓

Gas and fluid accumulates within the lumen of bowel

↓

Bowel distension

↓

Increased intra luminal and intra mural pressures

↓

Venous obstruction result in vascular engorgement, oedema and local venous hypertension

↓

Reflex arterial vasospasm

↓

Tissue hypoxia

↓

Intestinal Ischemia

↓

Bowel Infarction

BOWEL OBSTRUCTION: CLINICAL PRESENTATION AND RADIOLOGICAL FINDINGS

	Features	High small bowel obstruction	Low small bowel obstruction	Large bowel obstruction
1	Onset of symptoms	Sudden	Gradual	Insidious
2	Characteristics of pain	Epigastric, intense, colicky often relieved by vomiting, occasionally continuous	Periumbilical colic	Central or lower abdominal colic, possibly associated with generalised discomfort
3	Vomiting	Large volumes, bilious, frequent	Low volume and frequency; progressively faeculent with time	Intermittent, not frequent, faeculent
4	Tenderness	Epigastric or periumbilical usually mild unless strangulation is present	Diffuse and progressive	Diffuse
5	Distension	Absent	Diffuse and progressive	Diffuse
6	Obstipation	May or may not be present	Mild or moderate	Complete
7	Radiologic Findings	Abdomen may appear gasless or show distended proximal small bowel	Gaseous distension of small bowel, fluid levels on erect film	Gaseous distension of large bowel proximal to obstruction, small bowel may also show distension

INVESTIGATIONS:

Laboratory investigations:

Laboratory investigations are not diagnostic in patients with Acute Intestinal Obstruction but it is very much helpful in recuscitation and in assessing the general condition of the patient. A complete blood count, serum electrolytes, blood urea, serum creatinine is used to assess the renal status, electrolyte imbalance, fluid imbalance and used to diagnosis sepsis. Serum amylase and lactic dehydrogenase is used to evaluate bowel necrosis.

Leukocytosis of greater than 18,000 cells / cu mm is suggestive but not confirmatory of strangulation which can also present with leucopenia. Metabolic acidosis, amylase activity, serum phosphate level, creatine kinase, lactate dehydrogenase activity, liver enzyme activity and hematocrit are unreliable predictors of strangulation. Elevated Haemoglobin and packed cell volume indicates haemoconcentration due to dehydration. Blood urea will be increased.

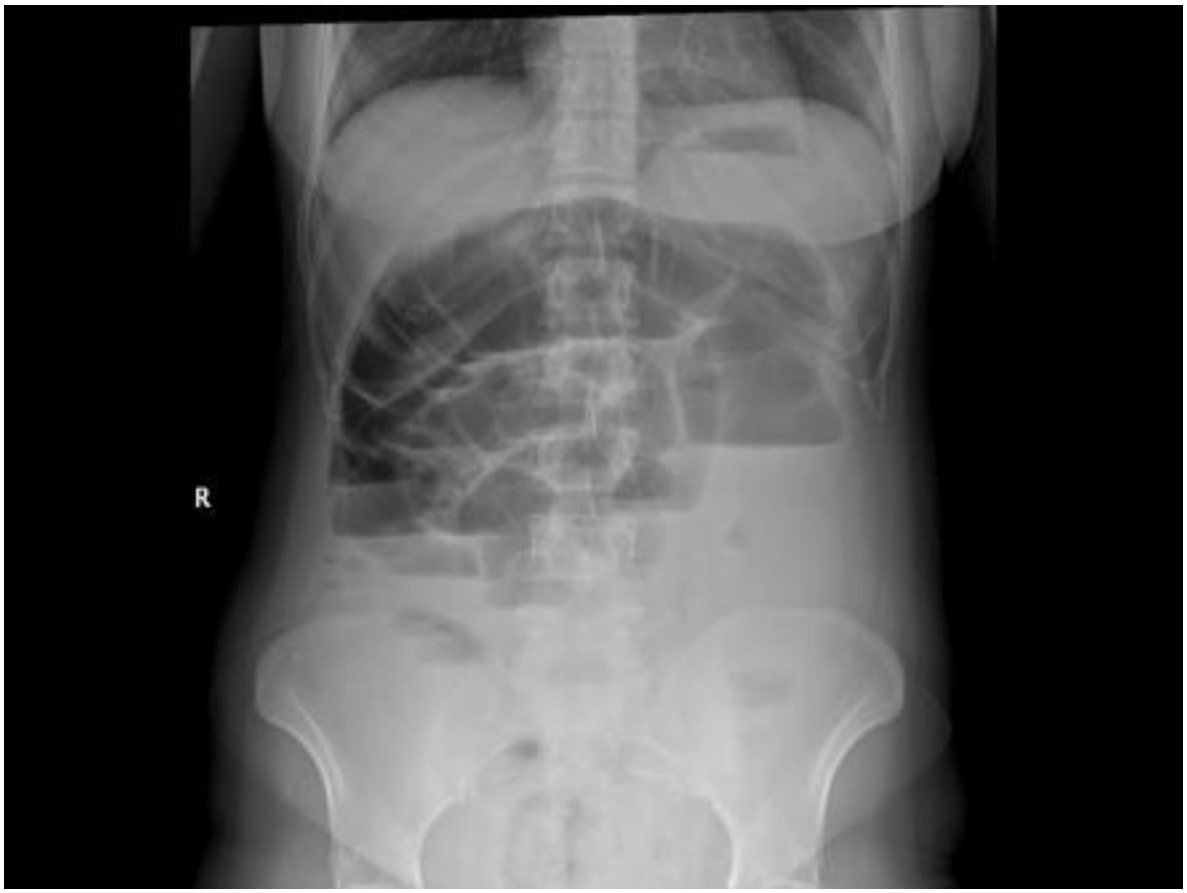
The presence of a significant metabolic acidosis is an ominous sign, yet its sensitivity as an indicator of strangulation is only 75%. Some patients with dead or dying bowel have no base deficit. Creatine kinase determination may be somewhat useful, as it is elevated in 71% of patients with strangulated bowel.

Initial fluid shift results in contraction of the extracellular fluid with antidiuresis, renal reabsorption of sodium, a rising blood urea nitrogen level and an increased urine specific gravity. With progressive obstruction and vomiting patients tend to develop hyponatraemia, hypokalemia, metabolic acidosis, hypochloremia and uremia.

Abdominal X-ray:

Plain x-ray supine and erect posture along with chest x-ray upright position has to be taken in all suspected cases of intestinal obstruction. The typical feature of small bowel obstruction is dilated bowel loops with air fluid levels. More proximal the obstruction lesser the air fluid levels since the length of the obstructed bowel is short. More distal the obstruction the air fluid levels increases. More than three air fluid levels is diagnostic

If the diameter of the small intestine is more than 3cm we have to think of obstruction. Diameter of large bowel varies with a relative threshold of 9cm for proximal large bowel and 5cm for sigmoid colon.



X – RAY SHOWING MULTIPLE AIR FLUID LEVELS IN A PATIENT WITH STRANGULATED INGUINAL HERNIA

PLAIN X- RAY ABDOMEN ERECT SHOWING SIGMOID

VOLVULUS WITH CLASSICAL COFFEE BEAN APPEARANCE.

PLAIN X-RAY ABDOMEN ERECT SHOWING DILATED JEJUNUM

Presence of pneumobilia suggests gall stone ileus. Sigmoid and caecal volvulus produces pathognomonic findings. Plain abdominal x-rays are diagnostic in around 80% of patients.

Signs of strangulation includes Pneumatosis intestinalis, Pseudotumour sign – fluid filled gangrenous loop appearing as a soft tissue mass, a fluid filled loop of bowel that remains stationary in sequential films.

Each part of the bowel has specific characters.

Jejunum – Valvulae connivantes are seen

Concertina / ladder effect.

Ileum - featureless

Caecum – rounded gas shadow in the right iliac fossa

Large bowel – presence of haustral folds

Sigmoid volvulus – Coffee bean appearance, bent inner tube appearance.

Contrast studies:

Indications are controversial. Gastrograffin enema is useful in intussusception. Gastrograffin diluted meal follow through and x-ray can be done in cases of partial obstruction.

Ultrasonogram:

Diagnosis of small bowel can be made with the help of ultrasound when the diameter measures more than 25mm and when the distal ileum

is collapsed.It has a sensitivity of 85% and specificity of 85% and an accuracy of 82%. It is helpful in identifying causes of intraluminal obstruction. (4)

CT abdomen:

When abdominal x rays are non specific and when we are not able to make an accurate diagnosis then CT abdomen plays an important role. It has sensitivity of 93% and specificity of upto 100%. It has 94% accurate in diagnosing small bowel obstruction. CT is accurate in identifying high grade partial obstruction and complete obstruction. (14)

Diagnostic Laparoscopy:

Diagnostic laparoscopy plays a key role in differentiating simple and strangulated obstruction. It is the only diagnostic tool which can differentiate obstructed and strangulated obstruction but the remaining investigations are supportive but not confirmatory. Diagnostic laparoscopy reduces major morbidity and mortality in patients who do not have strangulated obstruction. Major surgery can be avoided if there is no strangulation. Moreover definitive procedures can be done lapaaroscopically.

Paracentesis:

Paracentesis and assay of the peritoneal fluid is very much helpful when the clinical picture is confusing. The colour of the aspirated fluid is very much helpful in differentiating simple and strangulated obstruction.

Finding of white blood cells or bacteria suggests strangulation which warrants immediate laparotomy.

MANAGEMENT:

The fundamental principles involved in management of Acute Intestinal Obstruction includes

Recuscitation by correction of fluid and electrolyte imbalance

Decompression of gastro intestinal tract

Timely surgical intervention.

Emergency laparotomy must be done in all suspected cases of strangulation. In some patients with simple obstruction conservative management may be tried must be carefully observed for prevention of progression of disease.

Fluid and electrolyte balance:

Fluid and electrolyte imbalance must be rapidly corrected in all patients with intestinal obstruction. In cases of strangulated hernias we should not wait for complete normalisation. Surgical intervention must be done immediately along with correction of electrolytes and fluid management. We cannot assess the fluid loss and cannot be measured directly. In addition to fluids lost externally there will be loss of fluid in the third space. The magnitude of fluid loss can be measured with the help of blood pressure monitoring, urine output and by central line monitoring.

In elderly patients Swan Ganz catheter is used to measure pulmonary capillary wedge pressure, venous saturation and cardiac output. The ideal intravenous fluid is ringer lactate but in cases of gastric loss then normal saline is used. In case of intravascular fluid loss then crystalloids are used.

Nasogastric aspiration:

All patients with acute intestinal obstruction requires aspiration of the gastric contents through naso gastric tube either short or long depending on the patient.

The role of naso gastric tube are as follows:

To empty the gastric contents due to stasis in acute intestinal obstruction.

The colour of the fluid aspirated is helpful in finding the level of obstruction.

If the aspirated contents are clear then the obstruction is at the level of 1st part of duodenum. If the aspirated contents are bile stained then the obstruction is in the proximal small bowel. If the aspirated contents are faeculent then the obstruction is in the distal small bowel and large bowel.

Decompress the stomach and the proximal small intestine.

Prevents distension of the intestine by swallowed air.

It minimises the risk of aspiration during induction of the patient for general anaesthesia.

Tubes are either long (e.g: miller abbot) or short (non vented Ryle's and vented salem). Long tubes like miller abbot are of the double type with a channel for aspiration and with a balloon at the other end for advancement.

Long tubes may be useful initially to treat small bowel obstruction, particularly when the nasogastric suction has failed; intra operatively to decompress more distal bowel and to identify points of intrinsic obstruction and postoperatively to stent the bowel.

Antibiotics:

Antibiotics do not alter the course of disease in case of simple obstruction. But in case of strangulated of bowel there will be translocation of bacteria which produces toxins and it can be life threatening. More over in strangulated hernias resection and anastamosis of bowel has to be done where there is a chance of intra abdominal abscess and wound infection which can be prevented by the use of antibiotics.

Antibiotics covering both aerobic gram negative bacteria and anaerobes such as bacteriodes must be used. In case of simple obstruction a second generation cephalosporin such as cefoxitin or cefotetan will be helpful. Synthetic penicillin along with β lactamase inhibitors such as Ampicillin with Sulbactam is helpful. Aminloglycosides such as Gentamicin had to be used to prevent life threatening infections.

Monoclonal antibodies directed against endotoxins from gram negative bacteria have been developed. HA-1A and E5 are examples of immunoglobulin M antibodies used in current trials in patients experiencing shock due to complicated bowel obstruction. (3)

ROLE OF EXPECTANT NON OPERATIVE MANAGEMENT:

Surgery can be delayed in the following circumstances.

Early post operative obstruction:

Distension, vomiting, abdominal pain and failure to pass flatus in the post operative period is physiological due to paralytic ileus but mechanical obstruction may also be present. In post operative period over a period of time the paralytic ileus subsides.

Late post operative obstruction:

A special situation involves small bowel obstruction that develops 10 days to 4 weeks after a previous laparotomy. This window of time represents the most dangerous time for reoperation because the adhesions forming from the previous laparotomy can be extremely thick, intense and vascular. Strong consideration should be given to a primary non-operative approach with a planned gastric decompression for 3 to 6 months (by a percutaneous endoscopic gastrostomy or even a tube pharyngostomy) and parenteral nutritional support.

Intussusception:

Infants with ileocaecal intussusception responds to controlled hydrostatic reduction which is very much helpful in avoiding surgery.

Sigmoid volvulus:

In sigmoid volvulus colonoscopy or sigmoidoscopy is very much helpful in decompressing the obstructed sigmoid loop but care must be taken to avoid perforation.

Crohn's disease:

In patients with acute intestinal obstruction due to acute exacerbation a course of steroids or anti inflammatory drugs is very much helpful in resolution of intestinal obstruction.

Partial obstruction:

Patients with partial obstruction can be managed conservatively. In case of obstruction due to adhesions by repeated surgical intervention will further aggravate the problem except in case of strangulation where surgery is necessary.

Contra indication to conservative management:

Closed loop obstruction

Suspected strangulation

Hernia complicated by obstruction

Small bowel obstruction without previous surgery or hernia

SURGICAL MANAGEMENT

The most important step is differentiating simple obstruction and strangulated obstruction. There is no definitive sign or diagnostic test that is helpful in diagnosing strangulation.

Rarely patient exhibits all the signs of strangulation which are as follows

Fever

Tachycardia

Localised abdominal pain

Guarding/rigidity

Leucocytosis.

In the absence of the above signs strangulated bowel is found in 10% of cases. If there is no improvement even after 48 hours of presentation or if the clinical condition of the patient deteriorated then surgery has to be done.

When the exact site of obstruction is not known then midline incision is ideal. It is necessary to determine the site of obstruction, nature of obstruction and viability of the bowel.

Caecum is the best guide to the site of the obstruction. If the caecum is collapsed the lesion lies proximal to it. If it is distended then colonic lesion is suspected. From the ileo caecal junction the small

intestine is traced upwards following the collapsed loop to the level of obstruction.

The assessment of bowel viability is difficult in some cases. The difficulty arises are as follows

Determining viability in borderline cases

Delineating the extent of involvement

Intra operative methods in determining the viability of the bowel includes Doppler study of the mesenteric vessels intravenous fluorescein injection and examination under woods lamp.

When there is difficulty in determining the viability of the bowel then we have exteriorize both the ends so that we can inspect the circulatory status of the exteriorized ends. When in doubt a second look surgery after 24 hours is essential.

Nature of surgery depends on the cause:

1. Adhesions – Adhesiolysis
2. Obstructed hernia – Reduction of the hernia contents and closure of the defect
3. Malignant obstruction – If the resection of the involved segment is feasible then resection and anastomosis otherwise simple bypass to relieve the obstruction and definitive surgery at a later date when the general condition of the patient improves.

4. Inflammatory bowel disease – Bowel resection and stricturoplasty if conservative management fails.
5. Intra abdominal abscess – Ultrasound guided or CT guided aspiration is sufficient to relieve obstruction.
6. Radiation enteritis – Resection of the affected bowel or bypass of the affected segement.
7. Intussusception –

   < 24 hours – Hydrostatic reduction

   More than 24 hours – Resection and anastamosis
8. Recurrent obstruction - usually due to adhesions hence adhesiolysis is difficult. Plication is helpful or we can use 5% polyethylene glycol.
9. Sigmoid volvulus – Sigmoidectomy, end to end or end to side anastomosis by hand sewn technique or by stapler.
10. Caecal volvulus - caecopexy and caecostomy which is very much in decompression as well as fixation. If the bowel is gangrenous then hemicolectomy has to be done.
11. Large bowel malignancy

    Right sided colonic obstruction

    Obstructive right sided colonic tumours can be treated by a primary resection and anastomosis. Goligher and Smiddy were the pioneers who described right hemicolectomy as the

procedure of choice for obstructing tumours of the right colon. Intestinal continuity may be restored by side to side stapled ileo transverse anastomosis using a linear cutter stapler (multifire GIA 80, Autosuture) or by handsewn technique When the colon is obstructed by a carcinoma of the splenic flexure, an extended right hemicolectomy is the procedure of choice with anastomosis between the ileum and descending colon.

Left sided obstruction:

Left sided colonic obstructions were treated by three stage procedure consisting of a primary colostomy, subsequent definitive resection and finally reversal of the colostomy. This three stage procedure was gradually replaced by a two stage (Hartmann's procedure) and more recently by single stage procedure. In favourable circumstances a single stage procedure is a safe option in the management of malignant left sided colonic obstruction.

Single stage procedure either in the form of a subtotal colectomy with primary ileosigmoid or ileorectal anastomoses or an intra operative colonic lavage with immediate colo colonic or colo rectal anastomosis can be done.

The SCOTIA (subtotal colectomy versus on table irrigation with anastomosis) study group performed the first randomized trial comparing

these techniques for the management of left sided malignant colonic obstruction.

Hospital mortality rates were similar in the two groups, post operative morbidity was some what higher in the subtotal colectomy group.

The SCOTIA study group concluded that segmental resection following intra operative irrigation was the preferred option except in cases of perforation of the caecum when subtotal colectomy was more appropriate. (11)

RECENT ADVANCES

The use of self expandable metallic stents (SEMS) in relieving left sided colonic obstruction has become popular. The use of SEMS in colonic Obstruction was first reported by Itabashi in 1993.

SEMS are effective in relieving colonic obstruction temporarily in preparation for subsequent surgery, hence avoiding an operation in the emergency setting. Patients can subsequently undergo a single staged operation and can avoid a stoma in favourable circumstances. SEMS also provide a good means of palliating unresectable obstructing tumours.

Tejero, in 1997, introduced a three staged procedure for the relief of Malignant left sided colonic obstruction

1. resolution of the obstruction by means of a stent placed at the site of tumour.

2. recovery of the general state of the patient.

3. elective and final surgery (if not suitable, the stent may be used as a definitive palliative treatment). (10)

ROLE OF LAPAROSCOPY

Today, laparoscopy is being applied to a number of obstructing small bowel and colonic processes, such as relief of small bowel obstruction secondary to adhesions, foreign body removal, bypass procedures for malignant and benign disease causing intestinal obstruction, resection for appendicitis or a meckel's diverticulum causing intestinal obstruction and evaluation and resection for inflammatory bowel disease (ie. crohn's disease).

Laparoscopic treatment of small bowel obstruction if successful leads to a shorter hospital stay and quicker rehabilitation of the patient and has good long term results. With further experience, laparoscopic exploration is an excellent diagnostic modality in acute small bowel obstruction and may allow a fully laparoscopic adhesiolysis with relief of the intestinal obstruction.

Patients with complete and or distal small bowel obstruction are not candidates for laparascopic management. (9)

Conclusion:

In conclusion, most of the recent advances in the management of bowel obstruction consist of developments in the imaging modalities available to assist in the diagnosis itself, particularly with regard to the distinction between partial and complete obstruction. Unfortunately little progress has been made to enable physicians to detect early reversible strangulation. Because of the inability to detect reversible ischemia, there is a substantial risk of progression to irreversible ischemia when surgery is delayed for an extended period of time, especially in the setting of suspected complete obstruction.

It is encouraging, that some advances have been made in understanding the patho physiology and prevention of adhesion formation. Research efforts in the future should continue to focus on these issues as well as on the development of methods to better recognize early signs of strangulation.

MATERIALS AND METHODS

This is a prospective study of 100 patients admitted with features of Acute Intestinal obstruction in K.A.P.V. Govt. Medical college Hospital, Trichy from September 2010 to November 2012. This study includes the patients of Trichy district and adjacent districts of Karur, Dindigul and Namakkal who were admitted for acute intestinal obstruction and emergency surgery done for it.

A proforma is attached to all the case sheets who were diagnosed as having Acute Intestinal Obstruction. Abdomen X-ray is taken as a routine in all suspected cases. All the data were entered in the proforma and the patients were followed till discharge or death.

The details of signs and symptoms, diagnosis , surgical procedures, complications and outcome of the patient were entered in the proforma and they were tabulated and analysed. All the data obtained was entered in the master chart and tabulated for comparison and reference.

The observations were compared with the recent studies and literature available and conclusions were drawn.

OBSERVATION

A total of 100 patients admitted during the period from September 2010 to November 2012 at K.A.P.V. Government Medical college Hospital were included in the study. After admission the data regarding the patient were entered into the proforma and followed up until discharge/death. The data of 100 patients were entered in the master chart and analysed. The data obtained were compared and the observations done were given below.

Age distribution:

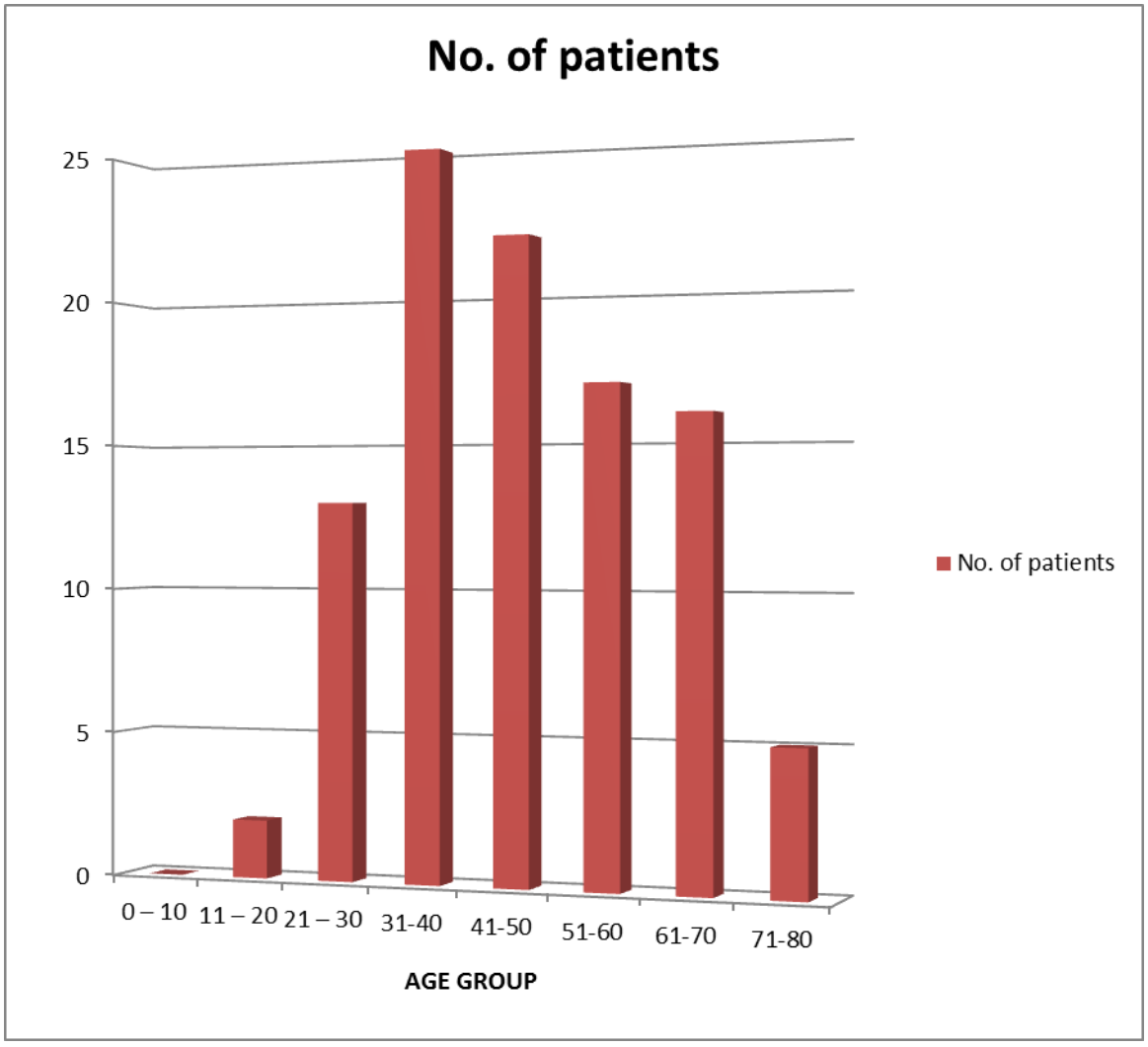
There is no age bar for Acute Intestinal Obstruction

Age in years	No. of patients
0 – 10	0
11 – 20	2
21 – 30	13
31-40	25
41-50	22
51-60	17
61-70	16
71-80	5

Average age of presentation of acute intestinal obstruction is 47 years.

Intestinal obstruction due to obstructed hernias was more common in age group between 31 – 40 years.

Maligancy is more common in the age group between 61 – 70 years.



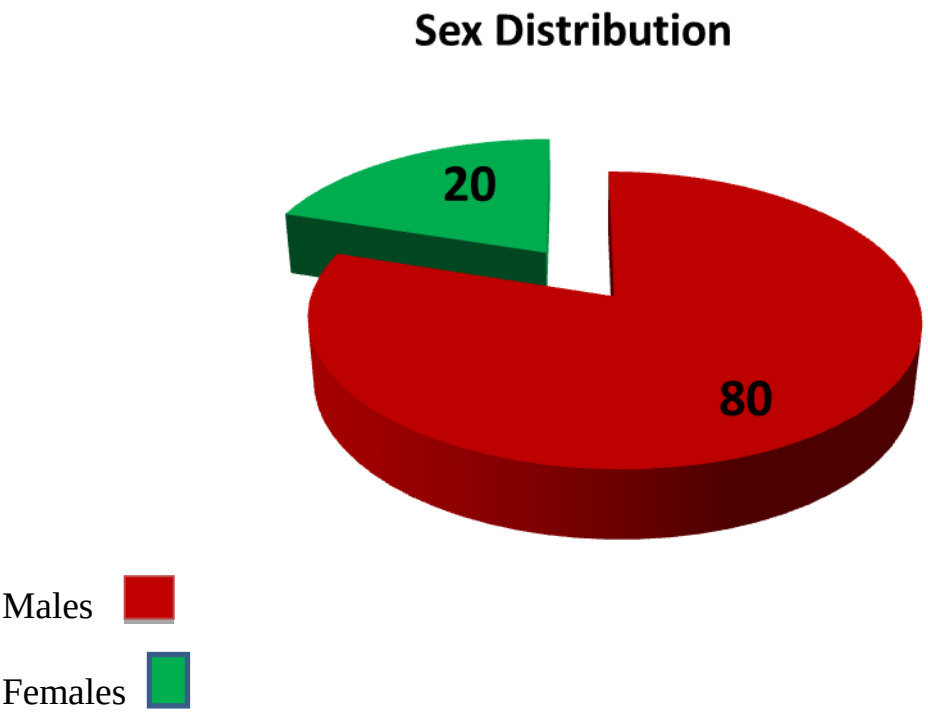
SEX DISTRIBUTION

The sex distribution of patients who were analysed were tabulated and given below.

Sex	No. of cases	Percentage
Male	80	80
Female	20	20

There is male pre ponderance in patients with acute intestinal obstruction

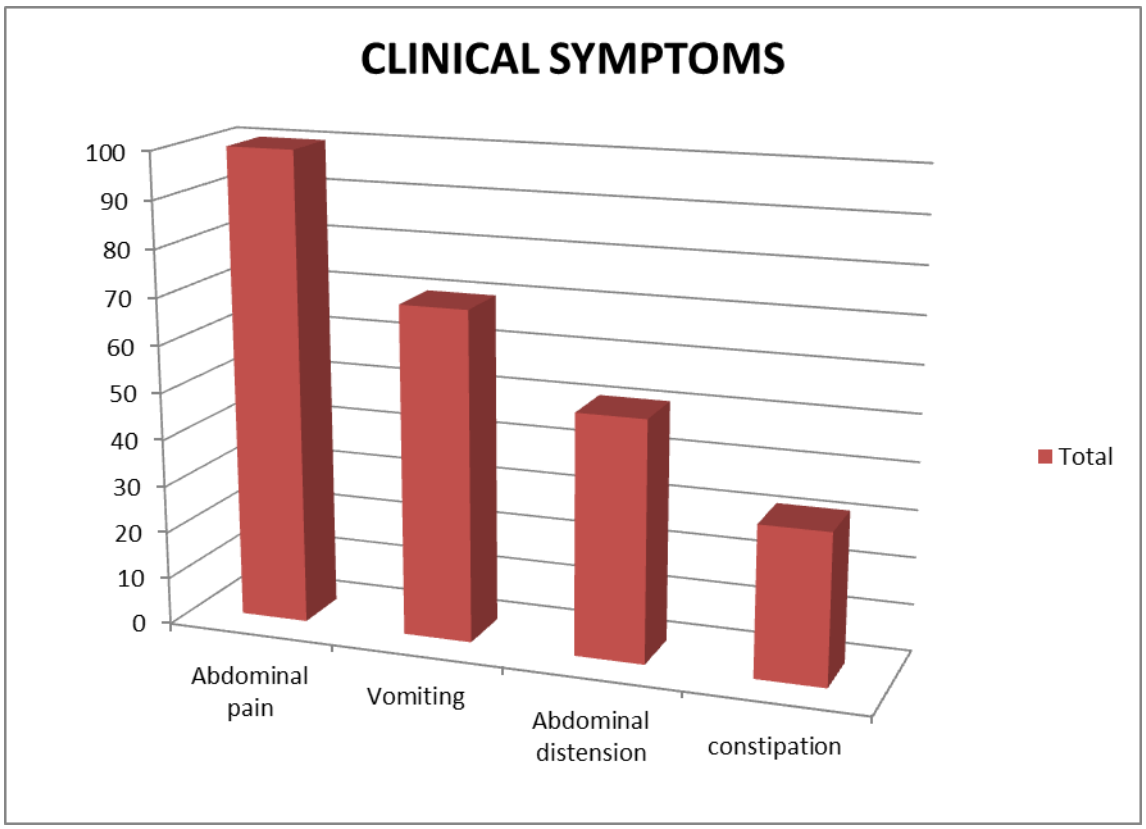
The Male to Female ratio is 4 : 1



CLINICAL SYMPTOMS:

Symptoms	Total no of patients
Abdominal pain	**100**
Vomiting	**70**
Abdominal distension	**51**
constipation	**32**

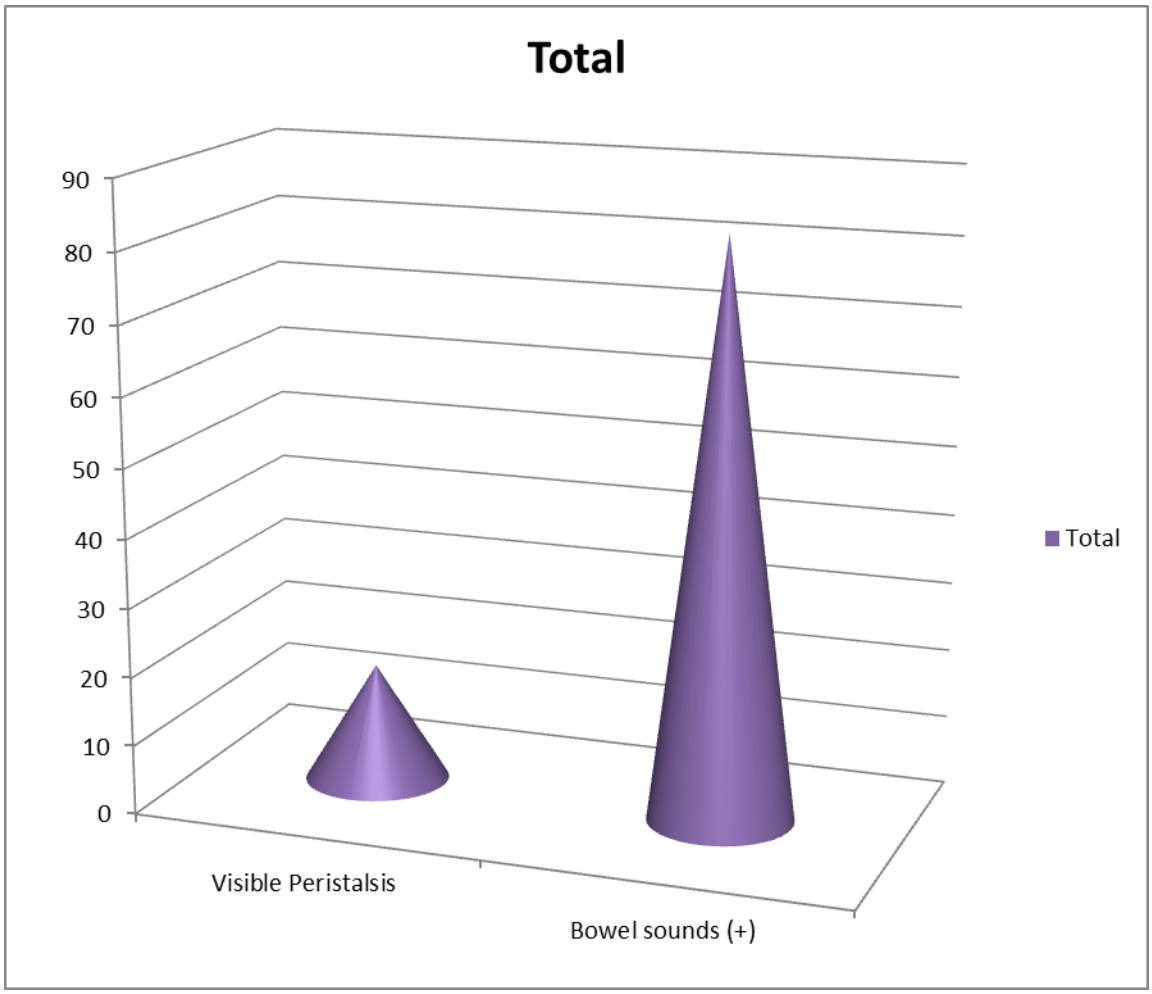
All the patients with acute intestinal obstruction had abdominal pain. Vomiting is present in 70 patients, abdominal distension in 51 patients and constipation in 32 patients.



Abdominal pain is present in all cases of patients with intestinal obstruction. The pain is graded into mild, moderate and severe based on the intensity of pain.

Vomiting is present in 70 patients. Vomiting is divided into three grades varying from mild, moderate to severe. Vomiting is defined as mild if there is less than 5 bouts per day, moderate if there is more than 5 bouts per day and severe if there is frequent bilious vomiting and faeculent vomiting. Abdominal distension was present in 51 patients. Constipation was present in only 32 patients. This was mainly due to early diagnosis of these patients.

Signs



Visible peristalsis was present in only 17 patients. Bowel sounds present in 83 patients. This is mainly attributed to early diagnosis. In the remaining 17 patients the absence of bowel sounds is mainly due to the fact that the patient present with strangulation.

DISEASE SPECTRUM

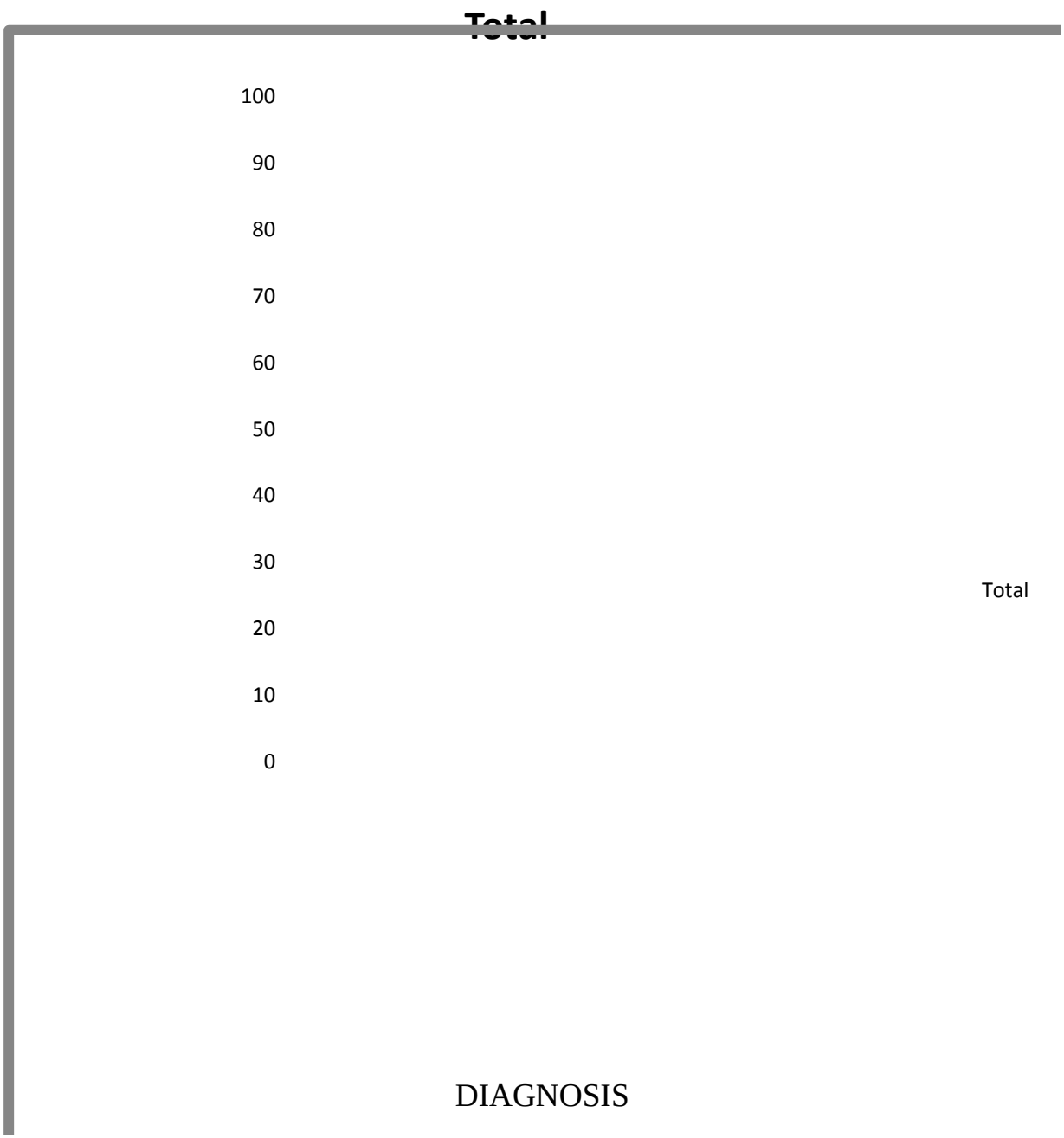
Hernia was the common cause of acute obstruction which accounts for 64% of the cases followed by adhesions which accounts for 15% of the cases.

Hernia was the common cause of acute obstruction mainly due to the fact that these patients do not report for surgery at the earliest and they seek medical attention only after they present with intestinal obstruction.

Carcinoma large bowel accounts for 5% of cases. Sigmoid volvulus was present in 5 cases. Intussussception was present in 4 cases, followed by ileo caecal tuberculosis in 3 cases. Congenital band, Ladd's band, Superior mesenteric artery thrombosis and twisted Meckel's diverticulum account for 4 cases.

DISEASE SPECTRUM

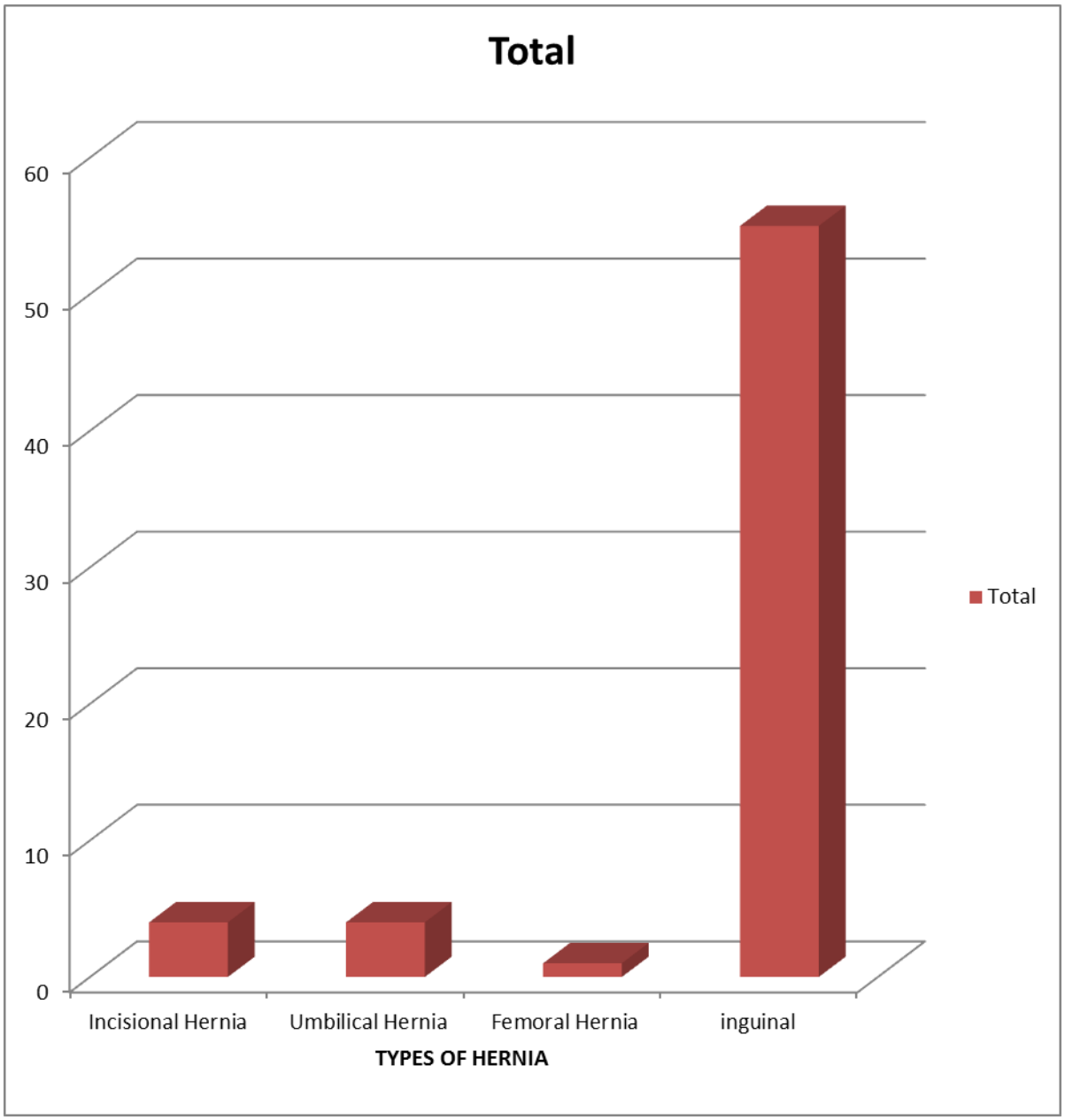
Diagnosis	Total
Obstructed Hernias	64
Adhesions	15
Carcinoma Large Bowel	5
Sigmoid volvulus	5
Intussusception	4
Ileo Caecal Tuberculosis	3
Congenital Band	1
Ladd’s Band	1
Twisted Meckel's diverticulum cyst	1
SMA Thrombosis, small Bowel occlusion	1
Total	100


Total
100
90
80
70
60
50
40
30
20
10
0
Total
DIAGNOSIS

TYPES OF HERNIA

Types	Total
Inguinal Hernia	**55**
Umbilical Hernia	**4**
Incisional Hernia	**4**
Femoral Hernia	**1**
Total	**64**

Inguinal hernia was the most common type of hernia in our study followed by incisional and umbilical hernias. Even in females the most common type of hernias is inguinal hernias. Of the 64 patients 50 patients had simple obstruction and the remaining 14 patients had strangulation.

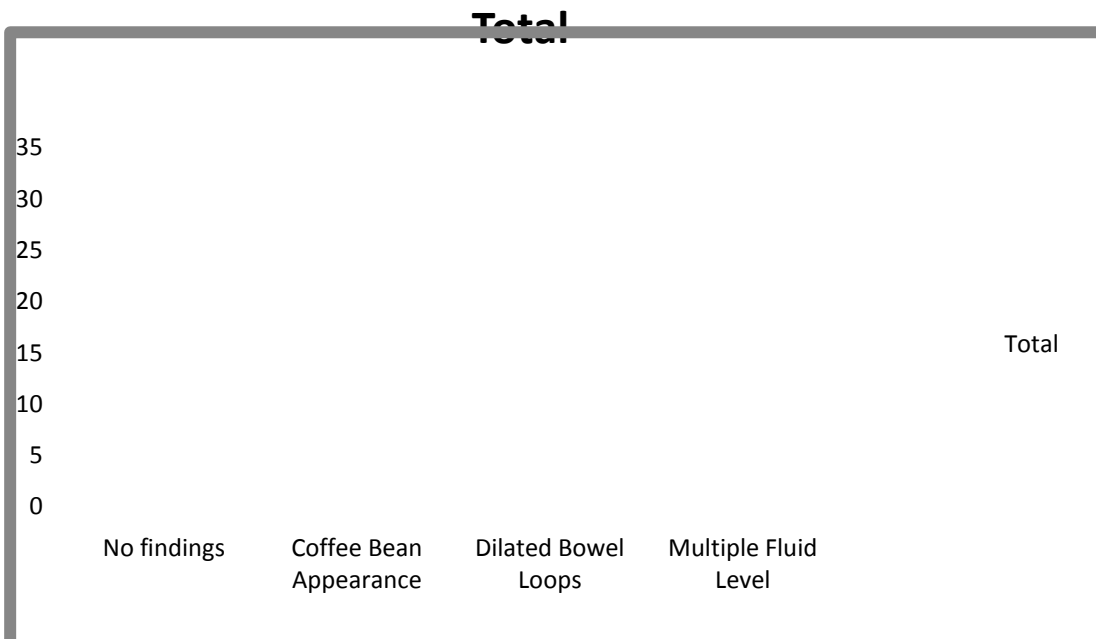

Total
60
50
40
30
20
10
0
Incisional Hernia
Umbilical Hernia
Femoral Hernia
inguinal
TYPES OF HERNIA
Total

INVESTIGATION:

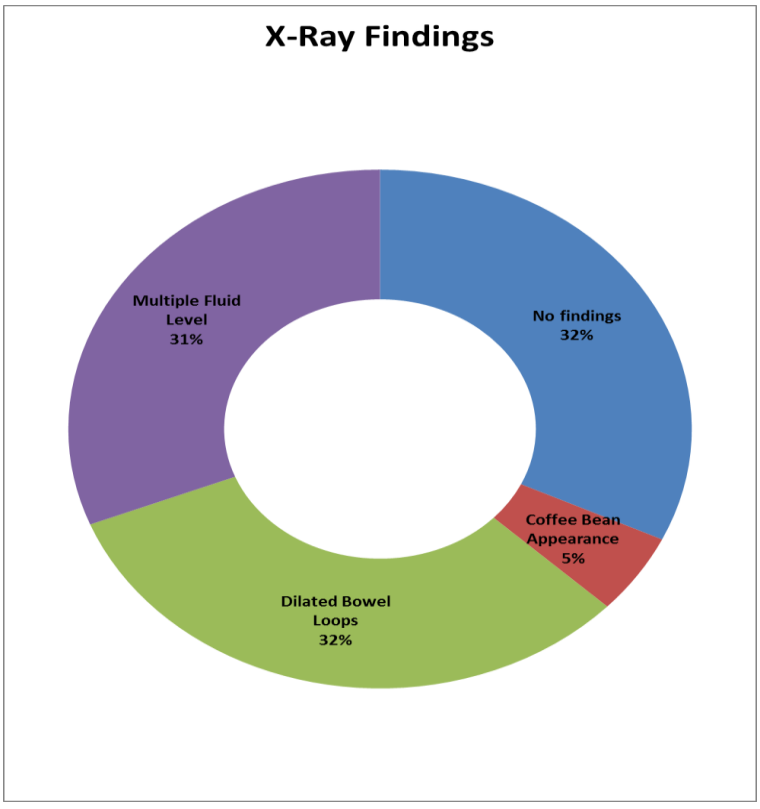
X-ray abdomen erect was the first line of investigation in all cases of Acute Intestinal Obstruction. The various features found were dilated bowel loops, multiple fluid levels and coffee bean appearance. X – ray abdomen was helpful in 68 patients. In remaining 32 patients the findings were inconclusive.

X – RAY FINDINGS

Findings	Total no of patients
No findings	32
Dilated bowel loops	32
Multiple fluid levels	31
Coffee bean appearance	5



Dilated bowel loops were present in 32 patients. Multiple fluid levels was present in 31 patients and Coffee bean appearance in 5 patients. X –ray was inconclusive in 32 patients.



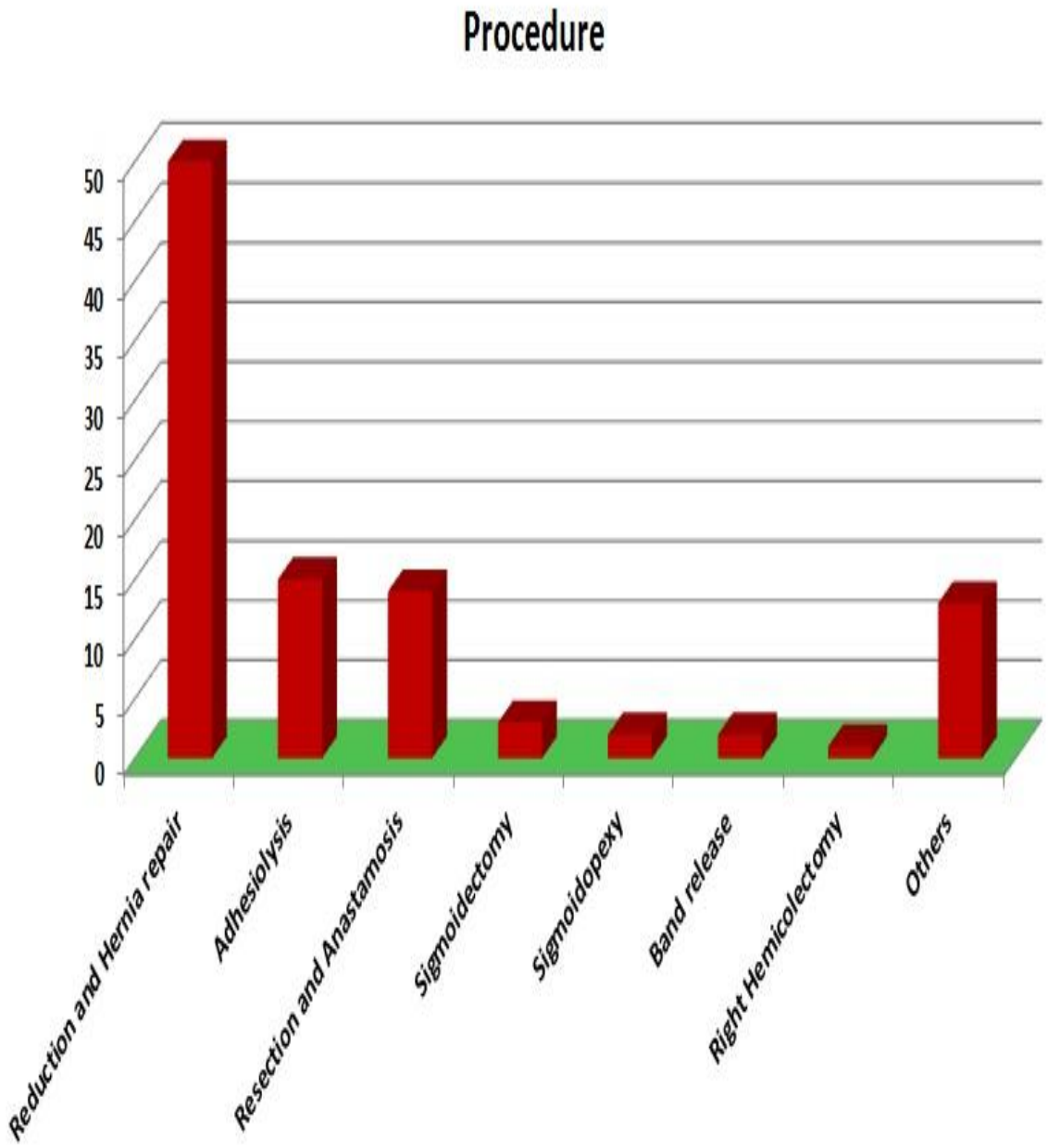
TREATMENT:

Procedure	No. of patients	Percentage
Reduction and Hernia repair	50	50
Adhesiolysis	15	15
Resection and Anastamosis	14	14
Sigmoidectomy	3	3
Sigmoidopexy	2	2
Band release	2	2
Right Hemicolectomy	1	1
Others	13	13

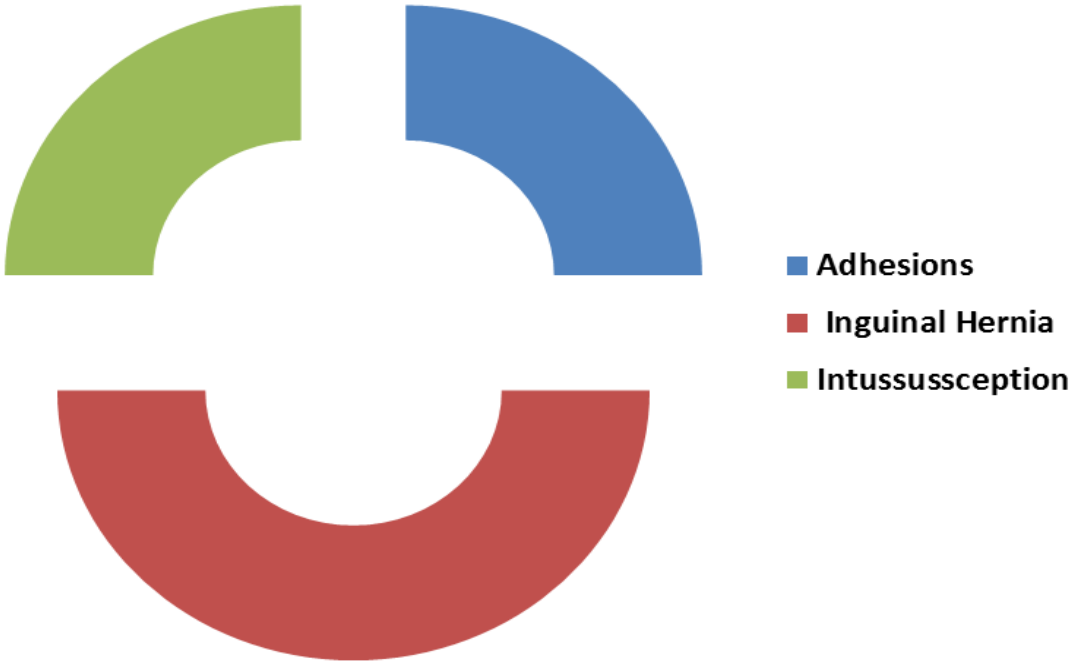
Out of the 64 patients with obstructed hernia patients 50 patients had simple obstruction underwent reduction of hernia and hernia repair. The remaining 14 patients had strangulated hernias who underwent resection and anastomosis.

Adhesiolysis was done in 15 patients who had adhesions due to previous surgery. Out of the 5 patients diagnosed as having sigmoid volvulus 3 underwent sigmoidectomy and end to end anastomosis and the remaining 2 patients underwent sigmoidopexy.

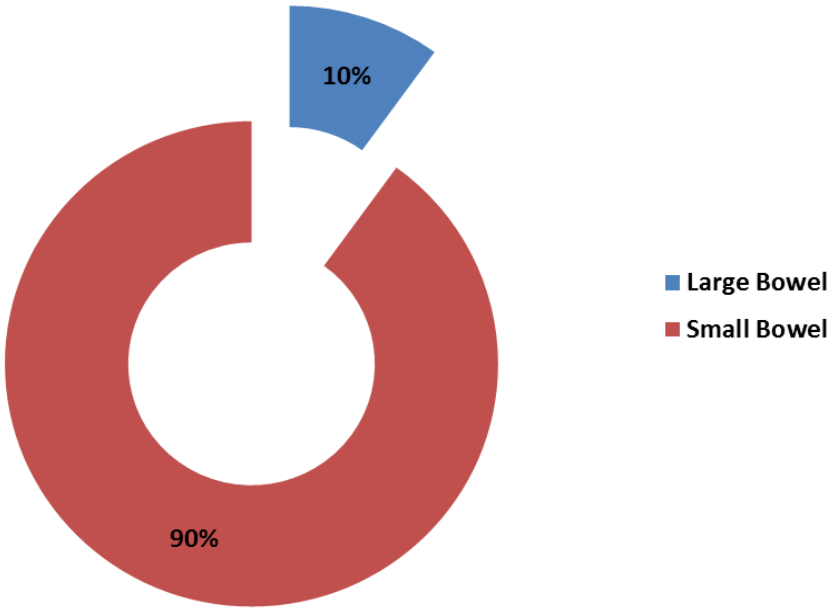
Release of bands was done in 2 patients who had congenital bands. Of the remaining 13 patients 5 patients underwent adhesiolysis and resection and anastomosis of small bowel, 3 patients underwent ileo transverse anastomosis 2 patients underwent ileostomy, 2 patients underwent diversion colostomy, 1 patient underwent Hartman's procedure.


Procedure
50
45
40
35
30
25
20
15
10
5
0
Reduction and Hernia repair
Adhesiolysis
Resection and Anastamosis
Sigmoidectomy
Sigmoidopexy
Band release
Right Hemicolectomy
Others

Relation of disease with mortality



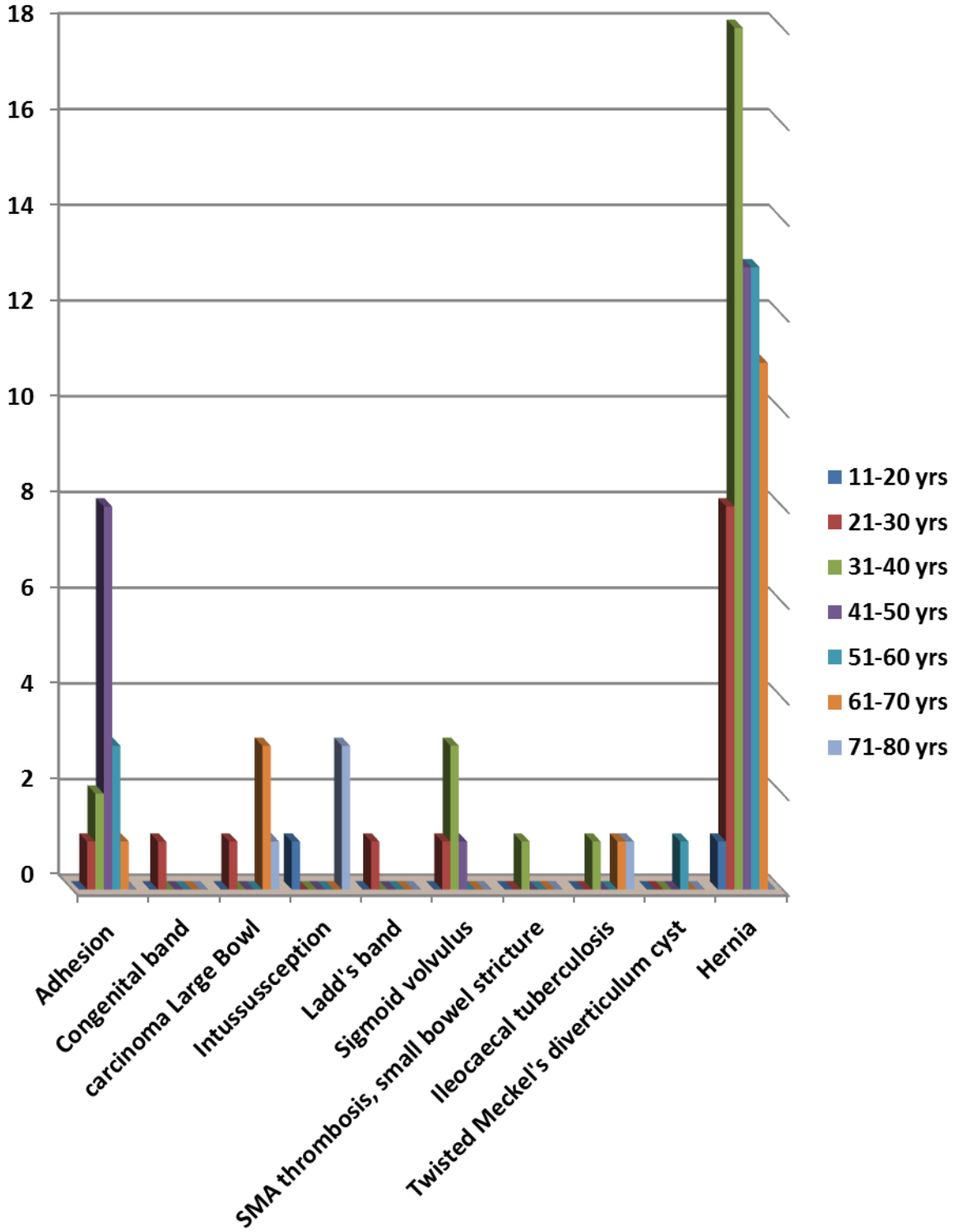
Large Bowel Vs Small Bowel Surgery



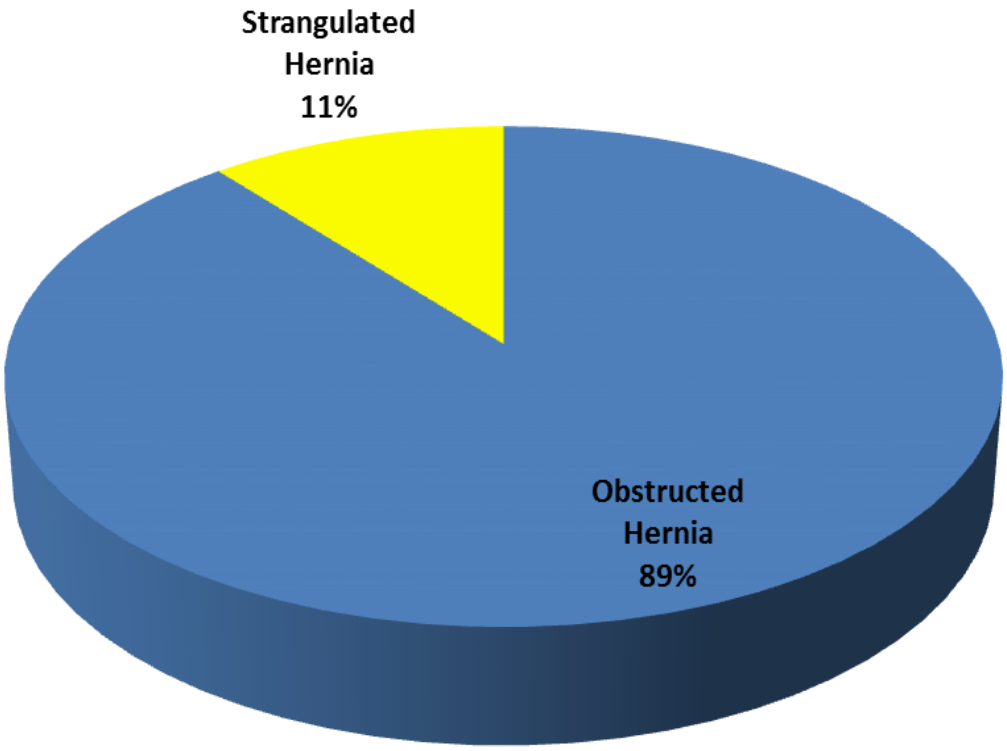
Age Distribution with Diagnosis

Diagnosis	11-20	21-30	31-40	41-50	51-60	61-70	71-80
Adhesion	0	1	2	8	3	1	0
Congenital band	0	1	0	0	0	0	0
carcinoma Large Bowel	0	1	0	0	0	3	1
Intussussception	1	0	0	0	0	0	3
Ladd's band	0	1	0	0	0	0	0
Sigmoid volvulus	0	1	3	1	0	0	0
SMA thrombosis, small bowel stricture	0	0	1	0	0	0	0
Ileocaecal tuberculosis	0	0	1	0	0	1	1
Twisted Meckel's diverticulum cyst	0	0	0	0	1	0	0
Hernia	1	8	18	13	13	11	0
Total	2	13	25	22	17	16	5

Age Distribution with Diagnosis

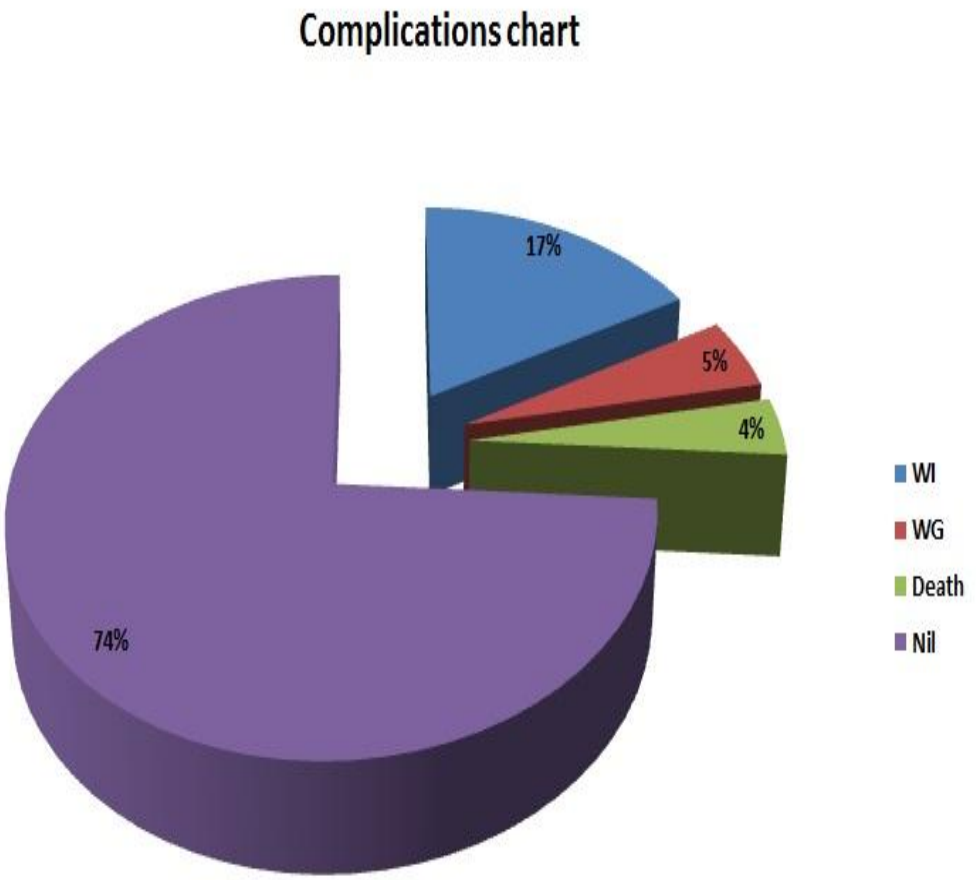


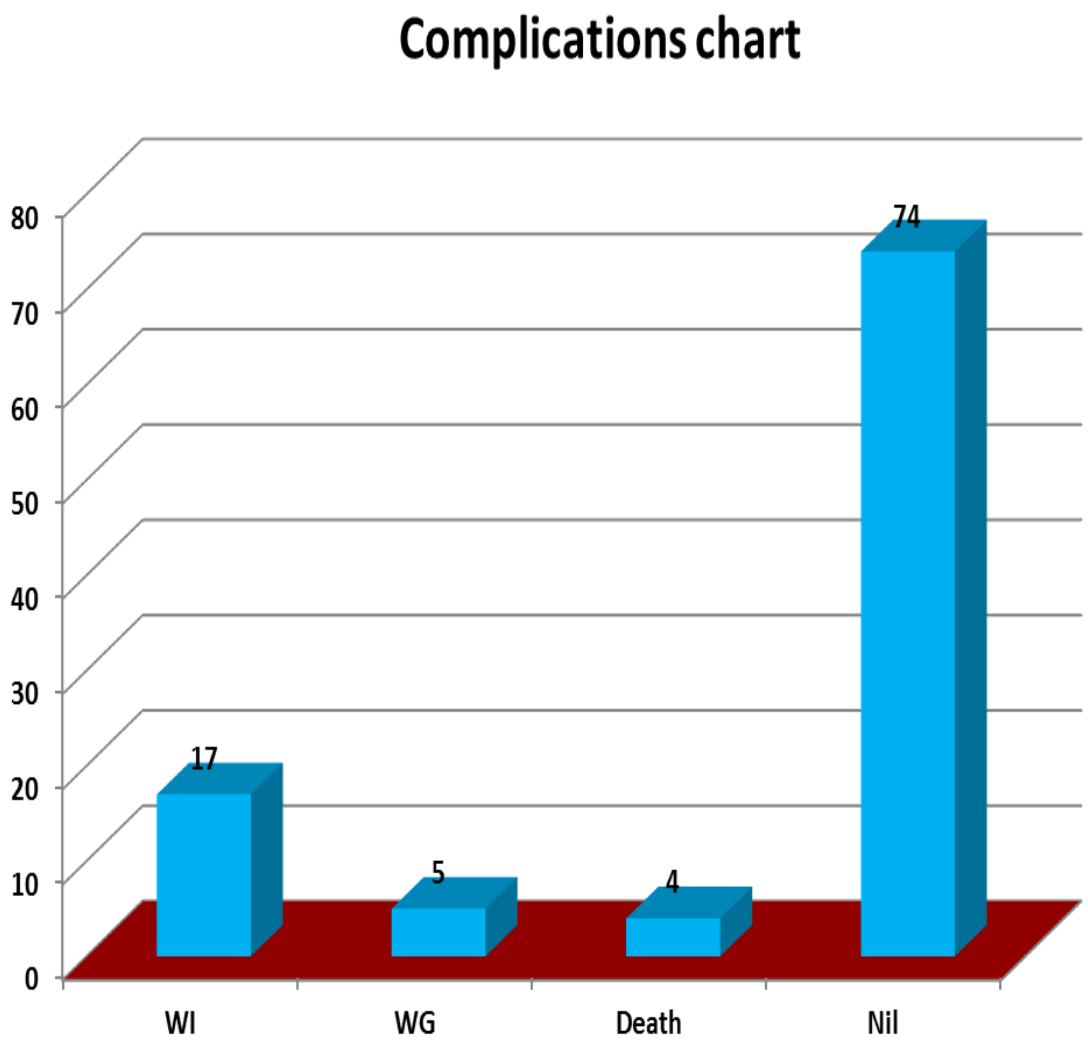
Comparision between obstructed and strangulated hernias



COMPLICATIONS

Out of the 100 patients included in our study 74 patients had no complications. 17 patients had wound infection. 5 patients developed wound gaping. 4 patients died as a result of anastamotic leak and septicaemia.




Complications chart
80
70
60
50
40
30
20
10
0
17
5
4
74
WI
WG
Death
Nil

OUTCOME

Outcome is graded into 4 classes

Grade I : Patients with uneventful recovery

Grade II : Patients with minor morbidity

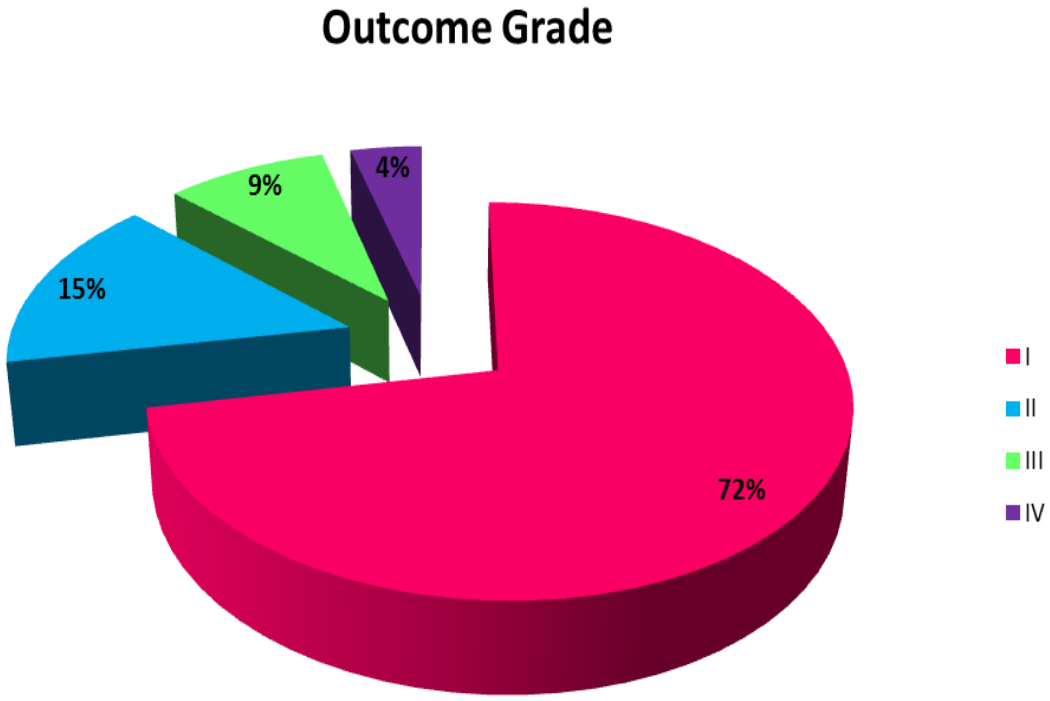
Grade III : Patients with major morbidity

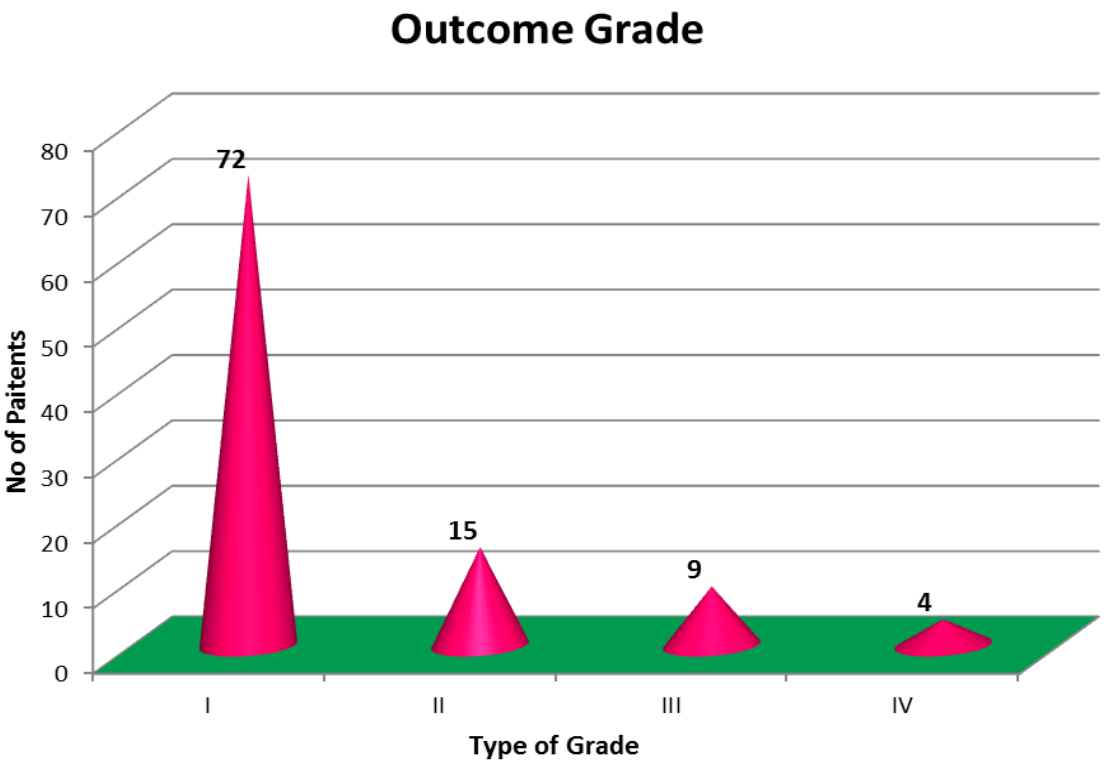
Grade IV : Patients who died post operatively

Minor morbidity includes wound infection, self limiting intestinal leak, post operative leak and mild cardio pulmonary deficit.

Major morbidity includes wound gaping, entero cutaneous fistula and mild to moderate cardio pulmonary deficit.

In our study 72% of patients had no complications. 15% of patients had wound leak, 9% of patients had wound patients. Mortality rate in our study was 4%


Outcome Grade
4%
9%
15%
72%
I
II
III
IV


Outcome Grade
80
70
60
50
40
30
20
10
0
No of Paitents
72
15
9
4
I
II
III
IV
Type of Grade

DISCUSSION

This study was conducted in order to analyse 100 patients admitted in our hospital for intestinal obstruction and underwent surgery during the period from September 2010 to November 2012. This study is mainly emphasised on the usual causes of intestinal obstruction that we have met and I have analysed the various clinical presentations, diagnosis made, the various presentations outcome and management of these patients. Paediatric patients, patients diagnosed as having paralytic ileus and patients who were treated conservatively were excluded from the study.

Total patients : 100

Male : 80

Female : 20

Hernias :

Obstructed hernias was the most common cause of intestinal obstruction in our study.

Types of Hernias:

Inguinal Hernia : 55 patients

Males : 52

Females : 3

Incisional hernia : 4 patients

Male : 1

Female : 3

Umbilical hernia : 4 patients

Male : 2

Female : 2

Femoral hernia : 1 patient – Female.

Of the 64 patients totally 50 patients underwent Reduction and hernia repair and the remaining patients underwent resection and anastomosis.

Incisional hernias is common in females because of the fact that they undergo various pelvic surgeries which is associated with incisional hernias and adhesions. Of the two patients who underwent surgery for obstructed hernias two patients expired due to septicaemia as a result of gangrene of small bowel.

89% of obstructed hernia patients had simple obstruction. The remaining 11% of patients had strangulated obstruction.

Adhesions:

Adhesions was the second common aetiology for Acute Intestinal Obstruction in our study.

Total no of patients : 15

Male : 6

Female : 9

In developing countries it is the second common cause of intestinal obstruction. But in developed it is the most common aetiology for intestinal obstruction. It is common due to the fact that more patients undergo gynaecological procedures which is commonly associated with adhesions.

Large bowel malignancy:

Total no of patients : 5

Caecal growth : 1

Ascending colon growth : 1

Descending colon growth : 2

Sigmoid colon growth : 1

Of these patients two patients underwent ileostomy one for caecal growth and another patient for ascending colon growth, Hartman's procedure for sigmoid colon growth, diversion colostomy for descending colon growth.

Sigmoid volvulus:

Third common cause of intestinal obstruction in our study.

Total no of patients: 5, Male : 5

Of these 5 patients 3 patients underwent sigmoidectomy and end to end anastomosis and the remaining 2 patients underwent sigmoidopexy. One patient had motor neuron disease.

Intussusception:

Total no of patients : 5

Of these patients one patient had intussusception due to trauma and submucosal haemotoma of ileum, another patient developed ileo colo colic intussusception due to carcinoid of appendix. One patient developed intussusception due to hamartamatous lesion of ileum. In the remaining two patients the cause was idiopathic. The common age group in our study was 61 – 70 years. All the patients underwent resection and anastomosis. Of these two patients expired as a result of septicaemia.

Ileocaecal Tuberculosis:

Total no of patients : 3

Of the three patients with ileo caecal tuberculosis one patients had adhesions who underwent adhesiolysis the remaining two patients had ileal stricture who underwent ileo transverse anastamosis along with course of anti tuberculous treatment.

All the patients had wound gaping which is mainly due to malnutrition and hypo proteinemia associated with tuberculosis.

REVIEW OF LITERATURE

The following studies are comparable to our study.

ACUTE INTESTINAL OBSTRUCTION IN ADULTS IN KUMASI, GHANA *M. OHENE-YEBOAH, E. ADIPPAH AND K. GYASI-SARPONG , Department of Surgery, Komfo Anokye Teaching Hospital, Kwame Nkrumah University of Science and Technology, University Post Office, Kumasi, Ghana. Ghana Medical Journal, volume 40 , No.2 , June 2006 (5)

Cause	No of patients	Percentage
Strangulated Inguinal Hernias	412	63
Adhesions and bands	176	27
Volvulus	38	5
Neoplasia	15	2
Intussusception	3	1
Others	8	2

The Pattern of intestinal Obstruction at Kibogola Hospital, a Rural Hospital in Rwanda

G. Ntakiyiruta[1], B. Mukarugwiro[2] [1]Department of Surgery, Faculty of Medicine, Kigali University Teaching hospital, [2]Intrahealth International Capacity Project Rwanda (7)

East and Central African Journal of Surgery, Vol. 14, No. 2, July-Aug, 2009, pp. 103-108

Diagnosis	**No of patients**	**Percentage**
Inguinal Hernias	33	31%
Intussusception	22	21%
Adhesions	18	18%
Sigmoid volvulus	11	11%
Internal hernias	6	6%
Femoral hernias	4	4%
Umbilical hernias	4	3%
Small bowel volvulus	3	2%
Ascariasis	2	2%
Caecal volvulus	1	1%
Ileosigmoid knotting	1	1%

Etiology and Outcome of Acute Intestinal Obstruction: A Review of 367 Patients in Eastern India

Adhikari Souvik, Mohammed Zahid Hossein, Das Amitabha, Mitra Nilanjan, and Ray Udipta, Departments of Surgery, Calcutta, India

Saudi J Gastroenterol. 2010 October; 16(4): 285–287. doi: 10.4103/1319-3767.70617. PMCID: PMC2995099 (6)

Diagnosis	**No of patients**	**Percentage**
Obstructed hernias	132	36
Malignancy	61	17
Adhesions	57	15
Intestinal tuberculosis	52	14
Volvulus	23	6
Intussusception	8	2
Miscellaneous	34	9

OUR STUDY

Diagnosis	Total
Hernia	64
Adhesions	15
Carcinoma large bowel	5
Sigmoid volvulus	5
Intussusception	4
Ileo caecal tuberculosis	3
Ladd’s band	1
SMA thrombosis, small bowel occlusion	1
Twisted Meckel's diverticulum cyst	1
Congenital band	1
Total	**100**

CONCLUSION

In our study the main aetiology for acute intestinal obstruction is obstructed inguinal hernias which is comparable to study conducted by Adhikari Souvik et al at Calcutta in 2010 where the most common aetiology is obstructed hernias. In studies conducted by G. Ntakiyiruta et al in Rwanda in 2009 and M. Ohene-yeboah et al in Ghana in 2006 the aetiology is obstructed hernias. This is mainly due to the poor socio economic of the patients in developing countries like India where the patients do not seek medical attention until they develop complications.

In developed countries the most common aetiology for acute intestinal obstruction is adhesions. There patients had a screening program and they do surgery at an earliest.

More over the recent advances in surgery like Laparoscopic surgery and the modern techniques have reduced the incidence of adhesions which is mainly responsible for the reduction in the incidence of patients with adhesions.

Even in the modern era clinical examination plays an important role in diagnosis of patients with intestinal obstruction. Modern investigations like USG abdomen and CT scan abdomen are diagnostic aids which helps us in correlating with the clinical findings and diagnosis of patients with intestinal obstruction.

PROFORMA

Name: Age: Sex:

I.P No.: Ward:

Date of admission : Date of surgery :

Date of discharge :

I PRESENTING FEATURES

1. Abdominal pain
2. Vomiting
3. Constipation/obstipation
4. Abdominal distension

II. PAST HISTORY

H/O PREVIOUS SURGERY

H/O TUBERCULOSIS

H/O HERNIAS

III. MENSTRUAL AND OBSTETRIC HISTORY

IV. FAMILY HISTORY

H/O TUBERCULOSIS

H/O MALIGNANCY

PERSONAL HISTORY

V. GENERAL EXAMINATION

BUILT & NOURISHMENT

PULSE RATE – TACHYCARDIA

BLOOD PRESSURE – HYPOTENSION

SIGNS OF DEHYDRATION

ANAEMIA

FEVER

JAUNDICE

OEDEMA

VI. EXAMINATION OF ABDOMEN

1. Surgical Scar
2. Visible intestinal peristalsis (or) Colonic peristalsis
3. Abdomen distension
4. Tenderness
5. Guarding
6. Rigidity
7. Mass Palpable
8. High pitched tinkling bowel sounds / silent abdomen
9. Hernial Orifices
10. PER RECTAL EXAMINATION – Roomy / empty rectum, blood,

A mass or a blummer shelf nodule palpable

11. PER VAGINAL EXAMINATION – Evidence of gynaecological Malignancy (or) inflammatory lesion

VII. EXAMINATION OF OTHER SYSTEMS

VIII. INVESTIGATIONS

Hb%

Total count

Differential count

ESR

Blood Urea

Blood sugar

Serum creatinine

Serum electrolytes

X-Ray abdomen erect

Chest X-Ray PA view

Ultrasonogram abdomen

IX. MANAGEMENT

1. Fluid and Electrolytes repletion
2. Decompression of gastro intestinal tract
3. Antibiotics

OPERATION

Findings

Procedure

Post operative period

Complications

Condition on discharge

X. FOLLOW UP

BIBLIOGRAPHY

1. John E. Skandalakis, Gene L. Colborn, Thomas A. Weidman, Roger S. Foster, Jr., Andrew N. Kingsnorth, Lee J. Skandalakis, Panajiotis N. Skandalakis, Petros S. Mirilas - Skandalakis' Surgical Anatomy ,2nd edition, 2006, Chapter 16
2. Susan Sandring, Gray's textbook of anatomy, 40th edition,
3. William S. Haubrich MD , Fenton Schaffner MD , J. Edward Berk, Bockus Gastroenterology, 5th edition, volume 2, page 1235-1247.
4. Michael J. Zinner, Stanley W. Ashley, Maingot's Abdominal operations, 11th edition, page 479 – 507
5. M. Ohene-yeboah, E. Adippah and K. Gyasi-sarpong , Acute intestinal obstruction in adults in kumasi, ghana ,Ghana Medical Journal, volume 40 , No.2 , June 2006
6. Adhikari Souvik, Mohammed Zahid Hossein, Das Amitabha, Mitra Nilanjan, and Ray Udipta,Etiology and Outcome of Acute Intestinal Obstruction: A Review of 367 Patients in Eastern India, Saudi J Gastroenterol. 2010 October; 16(4): 285–287. doi: 10.4103/1319-3767.70617. PMCID: PMC2995099
7. G. Ntakiyiruta1, B. Mukarugwiro, The Pattern of intestinal Obstruction at Kibogola Hospital, a Rural Hospital in Rwanda, African Journal of Surgery, Vol. 14, No. 2, July-Aug, 2009, pp. 103-108

8. Johnson C.D, I. Taylor Recent Advances in surgery 25, large bowel obstruction, Maheshinder singh, John R.J. Monson page 117 – 133.
9. Yeo & Matthews & McFadden & Pemberton & Peters, Shakelford's surgery of the Alimentary tract , 5th edition – volume, 2002, 317 – 338.
10. Martinez Santos C, Lobato RF, Fradija's JM, Pinto I, ortega-D eballon P, Moreno – Azcoita M, Department of general surgery, Getafe University Hospital, Madrid, Spain. Self expandable stent before elective surgery Vs emergency surgery for the treatment of malignant colorectal obstructions, comparison of primary anastomosis and morbidity rates Dis colon rectum 2002 Mar; 45 (3) : 401 – 6.
11. Lopez – Kostner. F, Graham R Hool, Ian C. Lavery, Management and causes of acute large bowel obstruction. Surgical clinics of north America 1997, 1267 – 1285
12. Koperna T, Kisser m, Schulz F, Department of general surgery, hospital Lainz, Vienna, Austria, emergency surgery for colon cancer in the aged, Arch surg 1997 Sep: 132 (9) : 1032 - 7.
13. Ihedioha U, alani A, Modak P, Chong P,O'Dwyer P, University Department of Surgery, western infirmary. Glassgow, Hernias are

the most common cause of strangulation in obstruction. Hernia 2006 Aug; 10 (4): 338 – 40. Epub 2006 Jun 8.

14. David Frager et al, CT of small bowel obstruction : Value in establishing the diagnosis and the degree of cause, American Journal of Radiology, 2004,162 : 37-41

15. Mucha P Jr: Small intestinal obstruction. Surgical Clinics of North America, 1987;67:597–620

16. Stewardson RH, Bobbeck CT, Nyhus LM: Critical operative management of small bowel obstruction. Ann Surg 1978;187: 189–193

MASTER CHART

Sl. No.	Name	Age	Sex	I P No	Pain	vomiting	Abd. Distension	Constipation	Visible Peristalsis	Bowel sounds	X ray	Diagnosis	Procedure	Complications	Outcome grade
1	Vellasamy	50	Male	34526	+	+	+	+	+	-	MFL	Adhesions	Adhesiolysis, resection and anastamosis	Nil	I
2	Arunachalam	75	Male	36204	+	+	-	-	-	+	MFL	Ileo ileal intussussception	Resection & anastamosis	WI	II
3	Kandasamy	35	Male	37527	+	-	-	-	-	-	CBA	Sigmoid volvulus	Sigmoidectomy & end to end anastamosis	WI	II
4	Mookayee	45	Female	39675	+	+	+	+	-	+	DBL	Adhesions	Adhesiolysis	Nil	I
5	Manikandan	35	Male	40599	+	-	-	-	-	+	-	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
6	Balasubramanian	60	Male	42056	+	+	-	-	-	+	-	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
7	Periyasamy	75	Male	45099	+	+	+	+	+	+	MFL	Caecal growth	Ileostomy	WI	II
8	Aarayee	55	Female	47653	+	+	+	-	-	+	DBL	Obst. Umbilical Hernia	Reduction & Anatomical repair	Nil	I
9	Dhanabackiyam	65	Female	50654	+	+	+	-	-	-	MFL	Obst. Incisional Hernia	Reduction & Mesh repair	WI	II
10	Gandhi	40	Male	52350	+	+	+	+	-	-	MFL	Rt. Strangulated Ing. Hernia	Emergency Laparatomy& Resection & anastamosis of small bowel	WG	III
11	Marimuthu	55	Male	53009	+	+	+	+	-	-	MFL	Lt. strangulated inguinal hernia	Emergency Laparatomy& Resection & anastamosis of small bowel	Nil	I
12	Siluvainathan	30	Male	2973	+	+	-	-	-	+	-	Rt. obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
13	Sakthivel	40	Male	4562	+	-	-	-	-	+	-	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
14	Jeganathan	55	Male	5645	+	+	+	-	-	+	DBL	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
15	Manickam	48	Male	6572	+	+	-	-	-	+	DBL	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
16	Raju	32	Male	9835	+	-	-	-	-	+	-	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
17	Senthamilselvan	28	Male	9874	+	+	+	-	-	+	DBL	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
18	Selvanathan	70	Male	10245	+	-	-	-	-	+	-	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	WI	II
19	Chenayee	57	Female	10600	+	+	+	+	+	+	MFL	Adhesions	Adhesiolysis	Nil	I
20	Avudaiyammal	45	Female	14567	+	+	+	+	+	+	MFL	Adhesions	Adhesiolysis	Nil	I
21	Ponnusamy	32	Male	17652	+	+	+	+	+	+	MFL	TB Ileal stricture	Ileo transverse anastamosis	WG	III
22	Maruthai	65	Male	22332	+	-	-	-	-	+	-	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
23	Rathinam	35	Male	23659	+	+	-	-	-	+	-	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
24	Yuvaraj	45	Male	25790	+	-	-	-	-	+	-	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
25	Nagaraj	56	Male	28756	+	+	+	+	+	-	MFL	Adhesions	Adhesiolysis, resection and anastamosis of small bowel	Death	IV

MASTER CHART

Sl. No.	Name	Age	Sex	I P No	Pain	vomiting	Abd. Distension	Constip ation	Visible Peristalsis	Bowel sounds	X ray	Diagnosis	Procedure	Complications	Outcome grade
26	Albert	29	Male	29185	+	-	-	-	-	+	-	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
27	Vairaperumal	28	Male	29857	+	-	-	-	-	+	CBA	Sigmoid volvulus	Sigmoidectomy & end to end anastamosis	WG	III
28	Tamil selvan	63	Male	29991	+	+	-	-	-	+	DBL	Obst. Umbilical Hernia	Reduction & Anatomical repair	Nil	I
29	Murali	35	Male	30921	+	-	-	-	-	-	-	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	i
30	Rajkumar	34	Male	32104	+	+	-	-	-	+	DBL	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
31	Venkatachalam	53	Male	32687	+	-	-	-	-	+	-	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
32	Rajamaniammal	60	Female	32798	+	+	-	-	-	+	DBL	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
33	Kandasamy	32	Male	34618	+	+	-	-	-	+	DBL	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
34	Theresammal	70	Female	34917	+	+	+	-	-	+	DBL	Obst. Incisional Hernia	Reduction & Anatomical repair	WI	II
35	Nallammal	35	Female	36786	+	+	+	-	-	+	MFL	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	WI	II
36	Govindaraj	45	Male	37652	+	+	+	-	-	+	MFL	Adhesions	Adhesiolysis	Nil	I
37	kavitha	39	Female	38253	+	+	+	-	-	+	DBL	Adhesions	Adhesiolysis	Nil	I
38	Moorthy	45	Male	39006	+	-	-	-	-	+	-	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
39	Thangaraj	52	Male	39182	+	+	+	-	-	+	DBL	Twisted Meckel's diverticulum cyst	Resection & Anastamosis	Nil	I
40	Muthusamy	70	Male	50550	+	-	-	-	-	+	-	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	WI	II
41	pyaree	70	Male	50660	+	+	+	+	-	-	MFL	Rt. Strangulated Ing. Hernia	Emergency Laparatomy& Resection & anastamosis of small bowel	Death	IV
42	Theresammal	45	Female	51702	+	+	+	+	-	-	DBL	Rt. Obst. Femoral Hernia	Reduction & Hernia repair	Nil	I
43	Srinivasan	38	Male	54535	+	-	-	-	-	+	DBL	Obst. Umbilical Hernia	Reduction & Anatomical repair	Nil	I
44	Nagaraj	60	Male	56250	+	+	-	-	-	+	DBL	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
45	Arumugam	55	Male	57396	+	+	+		-	-	MFL	Rt. Obst. Ing. Hernia	Resection and anastamosis of small bowel, Hernia repair	WI	II
46	kannan	35	Male	58256	+	-	-	-	-	+	-	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
47	kumarasamy	56	Male	559	+	-	-	-	-	+	-	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
48	Rani	40	Female	987	+	+	+	-	-	-	DBL	Adhesions	Adhesiolysis	Nil	I
49	Rajendran	55	Male	1087	+	+	+	+	-	+	MFL	Adhesions	Adhesiolysis	Nil	I
50	Murugan	48	Male	1160	+	+	-	-	-	+	-	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I

MASTER CHART

Sl. No.	Name	Age	Sex	I P No	Pain	vomiting	Abd. Distension	Constipation	Visible Peristalsis	Bowel sounds	X ray	Diagnosis	Procedure	Complications	Outcome grade
51	Sagayamary	47	Female	2626	+	+	-	+	+	-	MFL	Strangulated incisional hernia	Emergency Laparatomy& Resection & anastamosis of small bowel	WI	II
52	Dhanaraj	25	Male	2976	+	+	-	-	-	+	DBL	Ladd's band	Band release	Nil	I
53	Raju	49	Male	3598	+	+	+	-	-	+	MFL	Adhesions	Adhesiolysis	Nil	I
54	kumar	33	Male	4908	+	-	-	-	-	+	-	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
55	Anand	45	Male	5490	+	-	-	-	-	+	-	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
56	kannaiah	55	Male	7839	+	+	+	-	-	+	DBL	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	WI	II
57	Ganesan	39	Male	9542	+	-	-	-	-	+	-	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
58	Sakthivel	37	Male	10116	+	-	-	-	-	+	-	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
59	Rajeswari	43	Female	10171	+	+	-	-	-	+	DBL	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
60	Dhanabackiyam	65	Female	12644	+	+	+	-	-	+	DBL	Adhesions	Adhesiolysis	Nil	I
61	Raju	40	Male	13643	+	+	+	+	-	-	MFL	SMA thrombosis, small bowel stricture	Resection & Anastamosis of small bowel	WI	II
62	Gopinath	28	Male	17936	+	+	+	+	-	-	DBL	Adhesions	Adhesiolysis	Nil	I
63	Gokul	30	Male	18450	+	-	-	-	-	+	-	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
64	Narayanan	68	Male	19753	+	+	+	+	-	+	DBL	Ascending colon growth	Ileostomy	Nil	III
65	Anitha	69	Female	20287	+	+	+	+	+	+	MFL	Descending colon growth	Diversion colostomy	Nil	III
66	Margo	22	Male	21717	+	-	-	-	-	-	-	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
67	Mani	45	Male	22168	+	+	+	+	-	+	CBA	Sigmoid volvulus	Manual derotation & sigmoidopexy	Nil	I
68	Laxmi	29	Female	22868	+	+	+	+	+	+	DBL	Sigmoid colon growth	Hartmann's procedure	Nil	III
69	Loganathan	17	Male	27223	+	-	-	-	-	+	-	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
70	Ajith kumar	15	Male	27654	+	+	+	+	-	+	MFL	Intussusception	Resection anastamosis	Nil	I
71	Thirunavukarasu	29	Male	27987	+	+	-	-	-	+	DBL	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
72	Peer Mydeen	50	Male	28009	+	+	-	-	-	+	-	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
73	Mani	70	Male	28577	+	+	+	+	-	-	MFL	Strangulated rt. Ing. Hernia	Emergency Laparatomy& Resection & anastamosis of small bowel	WG	III
74	Nagarathinam	49	Female	29786	+	+	+	+	+	+	MFL	Adhesions	Adhesiolysis	Nil	I
75	Nagaraj	72	Male	32918	+	+	+	-	-	+	DBL	Ileo colic intussusception	Right Hemicolectomy	WI	II

MASTER CHART

Sl. No.	Name	Age	Sex	I P No	Pain	vomiting	Abd. Distension	Constip ation	Visible Peristalsis	Bowel sounds	X ray	Diagnosis	Procedure	Complications	Outcome grade
76	Rajangam	34	Male	33598	+	+	+	+	-	+	CBA	Sigmoid volvulus	Sigmoidectomy & end to end anastamosis	Nil	I
77	Kaliyaperumal	45	Male	34578	+	+	-	-	-	+	-	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
78	krishnan	33	Male	34622	+	+	-	-	-	+	DBL	Lt. strangulated inguinal hernia	Emergency Laparatomy& Resection & anastamosis of small bowel	WI	I
79	Sakthi	25	Male	34701	+	+	+	+	+	+	MFL	Congenital band	Adhesiolysis	Nil	I
80	Subramani	69	Male	34720	+	+	+	+	+	+	MFL	TB abdomen	Adhesiolysis	WI	I
81	Bastin	65	Male	42392	+	+	+	-	+	+	MFL	Growth descending colon	Transverse colostomy	Nil	III
82	Sevu	50	Male	43061	+	-	-	-	-	+	-	Lt. obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
83	Rajamani	55	Male	43765	+	-	-	-	-	+	-	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
84	Marimuthu	65	Male	43902	+	+	+	-	-	+	DBL	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
85	Periyasamy	35	Male	44006	+	-	-	-	-	+	-	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
86	Rajamani	45	Female	44579	+	+	+	+	+	+	MFL	Adhesions	Adhesiolysis	Nil	I
87	Narayanan	55	Male	44920	+	-	-	-	-	+	-	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
88	Subramani	55	Male	46583	+	+	+	+	+	+	MFL	Obst. Incisional Hernia	Reduction & Anatomical repair	WI	II
89	Santhanam	72	Male	46628	+	+	+	+	-	+	MFL	Intussussception	Resection and anastamosis of jejunum	Death	IV
90	Govindhan	72	Male	46752	+	+	+	+	+	+	MFL	TB Stricture ileum	Adhesiolysis & Ileo transverse anastamosis	WG	III
91	Vazhammal	70	Female	47092	+	+	+	-	-	+	DBL	Obst. Umbilical Hernia	Reduction & Anatomical repair	WI	II
92	Natarajan	40	Male	47559	+	+	+	+	-	+	CBA	Sigmoid volvulus	Sigmoidectomy & end to end anastamosis	Nil	I
93	Anbu	65	Male	47622	+	+	+	+	-	-	MFL	Strangulated inguinal hernia rt. Side	Emergency Laparatomy& Resection & anastamosis of small bowel	Death	IV
94	Mydeen	35	Male	47982	+	-	-	-	-	+	DBL	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
95	Arockia selvi	45	Female	48006	+	+	+	+	+	+	MFL	Adhesions	Adhesiolysis	Nil	I
96	Mohammed Hussain	43	Male	48522	+	-	-	-	-	+	-	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
97	Sankar	48	Male	49006	+	+	+	-	-	+	DBL	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
98	Antony	22	Male	50229	+	-	-	-	-	+	-	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
99	Ramalingam	28	Male	51239	+	+	-	-	-	+	DBL	Rt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I
100	Alagarsamy	39	Male	52983	+	+	+	-	-	+	DBL	Lt. Obst. Ing. Hernia	Reduction & Hernia repair	Nil	I

KEY POINT FOR MASTER CHART

MFL	-	Multiple Fluid Levels
DBL	-	Dilated Bowel Loops
CBA	-	Coffee Bean Appearance
WI	-	Wound Infection
WG	-	Wound Gaping